Energy Policies for the 1980s

An Economic Analysis

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Energy Policies for the 1980s: An Economic Analysis

ONTARIO ECONOMIC COUNCIL
SPECIAL RESEARCH REPORT

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Preface

The Council views its role in at least two ways. In one view, on the basis of studies it has commissioned and other analyses available to it the Council prepares position papers on a wide range of matters that call for action - or occasionally no action - by government. In the other view it makes available to government and the public the results of responsible research bearing on such matters, its aim being not so much to persuade as to inform. This publication falls into the latter category.

The study of energy economics has been high on the agenda of almost every country for more than six years. Energy did not suddenly become 'short'; but it was only with the OPEC embargo of late 1973, followed by the dizzy succession of increases in the price at which its members would contract to sell crude petroleum, that governments began to seek ways to adjust their economies to the energy shortage. This development is bound to reshape ways of living and producing - indeed to reshape the world as nothing else has done in the century except for two world wars and the great depression.

Very naturally, the first reaction of many national governments was to do nothing in the hope that OPEC would break up or that what simple arithmetic could readily demonstrate - that non-renewable resources must eventually grow scarcer - would somehow vanish if everyone pretended that the laws of subtraction did not apply.

Canada is unusual with respect to these problems. For energy in total the country is virtually self-sufficient on a net basis. However, Canada is now a net importer of oil. Further, regional imbalances exist which affect the security of supply in Eastern Canada. Also, as the world price of energy rises - and it is due to rise further and further - Canada faces internally the very problem the world economy has confronted ever more intensely since 1973, that of growing regional disparities.

Ontario is an energy have-not region and, apart from its hydroelectric resources and nuclear energy industry, must 'import' almost all the rest of the energy it consumes. It is already clear that these regional imbalances can threaten not only the prosperity of Ontario, Quebec, Manitoba, or the Maritimes, but also the economic prosperity of the Dominion and even its continued existence as a single unified country. Ontario's interest in policies adopted for coping with the world problem is therefore real and likely to intensify.

The Ontario Economic Council anticipated in the spring of 1979 that in Canada the energy question was going to move quickly to the centre of the stage. The Council arranged a conference, held in late September 1979, which gave rise to the two volumes of papers and proceedings presented here.

The issues, as we anticipated, are complex and technical. The policies we need - the policies that will enable us to adapt to the energy shortage with as little pain as possible - can be developed only by the exercise of careful and objective analysis applied to an accurate record of the facts. It was our belief that the academic community could best provide speakers and discussants who would meet these requirements. We invited industry and government spokesmen to participate in the panel discussions of the papers presented, and a lively dialogue was stimulated from the floor by all attending. As well, we sought a regional balance among contributors. Three of the papers read to the Conference were prepared in Ontario and three in the West; the two background papers, which incidentally were most useful, were prepared in Ontario, though Dr Hartle, who wrote one of them, hails from the Prairies; and the issues were summarized at the end by the rapporteur, a Canadian, who is a distinquished member of Harvard's faculty of economics and therefore presumably 'neutral.' We likewise sought a sensible variety of discussants.

The meeting was acclaimed as unusually instructive and interesting. We hope that our readers will see why.

It is surely unnecessary to stress that the views set forth in the various papers do not necessarily coincide with the views of the Council. However, the Council will present its own policy recommendations on this difficult problem in the near future.

We take this opportunity to express our gratitude to all those who participated in the conference - in particular to those who prepared papers for the meetings, to the discussants on the programs, and to those who participated from the floor.

Thomas E. Kierans

T.E. Kierans
Chairman
Ontario Economic Council

Energy Policy: Overview and Macroeconomic Implications

T. A. Wilson

The present energy situation represents perhaps the most complex set of economic problems in the world at the present time. It has important macroeconomic as well as microeconomic aspects, and it impinges upon widely held social and economic objectives. Moreover, the magnitudes of the necessary adjustments are large so the effect of alternative policies on different objectives is also large.

My present task is the unenviable one of surveying the major issues in this field and appraising the macroeconomic implications of alternative energy policies. I shall first attempt to review the important microeconomic issues dealt with by the various papers to be presented, trying neither to steal the authors' thunder nor bring it down on my head. Then I shall turn to my second task, a discussion of the macroeconomic issues, which fortunately are only tangentially dealt with by the other speakers.

Viewed from a microeconomic standpoint the issues of energy pricing, energy investment, energy taxes and subsidies, and the regulation and control of energy supplies, exports and imports, represent a set of problems and policies which involve a basic tradeoff between equity and efficiency. Since very large transfers of income and wealth are involved the issue of equity cannot be ignored.

As an economist, I share our profession's general predilection that the set of prices that would prevail under workably competitive markets is necessary for the attainment of an efficient allocation of scarce resources.[1]

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[1] Of course for competitive prices to be efficient there must be no externalities that cannot be handled by markets and sufficient information for producers and consumers to make rational choices. In the energy area the possibility of significant adverse environmental side-effects may mean that prices somewhat above the competitive level would be optimal.

In view of this predilection it is hardly surprising that there is a solid consensus among our contributors that Canada ought to move (soon?) to the world price of oil, which is the price that would prevail under workably competitive, unregulated markets on this continent.[2] However, I have some reservations about this proposition, and particularly about the timing of any increases in prices.

The problem with adjusting to the world price, and especially with adjusting quickly to the world price is that many large transfers of income and wealth are engendered by the price increase. What this means is that the increase in the price cannot be recommended on scientific grounds alone, unless some mechanism is established to compensate the losers so that they are willing to accept the price increases.

Let us leave aside for the moment the very important intranational transfers that would occur under present tax/transfer arrangements. Under these arrangements there would also occur an enormous transfer of income and wealth to non-resident owners of multinational energy companies. My back-of-the-envelope arithmetic indicates that under present arrangements the effects of this transfer would likely dominate the efficiency gains under a reasonable set of assumptions, so that from the standpoint of Canadian nationals collectively an increase in the price of oil under present tax/transfer arrangements is not desirable; that is, the sum of the gains of Canadian winners is clearly less than the sum of the losses of the Canadian losers.[3]

Several of the papers in this conference suggest alternative ways of capturing all or most of the increase in rents that would otherwise accrue to foreign and domestic corporate claimants of access to oil and other energy resources. Waverman proposes a net profits tax at high rates, and

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[2] This is not to deny that the world price is largely determined by the decisions of the OPEC cartel. From the standpoint of North American markets, however, the OPEC price is given, and perfect competition among North American buyers and sellers would result in a price equal to the OPEC price plus relevant transportation costs.

[3] If we assume an elasticity of net demand of -0.5 per cent (this is, if anything, an overestimate; see, for example, the demand elasticities estimated by Fuss and Waverman, 1975) a $10 increase in oil prices, an increase of about 70 per cent, would lead in the long run to a 35 per cent reduction in net demand. The improvement on allocative efficiency would be approximately $1.75/barrel, but the transfer to non-resident individuals of such an increase under present tax transfer arrangements would be at least $2.00/barrel.

Hartle proposes a system of variable excise tax levies. I shall leave consideration of the relative merits of either scheme or of alternatives from the standpoint of administrative feasibility and economic viability to the other authors. What I want to emphasize is that without such a scheme in place it is not in our national interest (broadly viewed) to raise the price of oil by one cent, let alone by ten dollars!

The other side of the income/wealth transfer issue is more intractable. I refer of course to the intranational transfers of income and wealth from ultimate consumers (most of us) of oil and other energy to ultimate domestic owners (residents of producing provinces, private owners of resources, and owners of resource companies' equities).

These potential transfers are very large (more than $7 billion, of which $3 billion would accrue to producing provinces, if the price of oil were adjusted under current taxation and royalty arrangements), and they involve a number of intergovernment flows, with the governments assuming part of the financial/intermediary function in this case. Moreover, the competing claims on income flows from these resources are clouded by the Canadian constitution. The provinces have complete ownership rights to the resources; but the federal government's overriding authority to tax, to regulate interprovincial and international trade, and if necessary to overrule provincial authority under the 'peace, order and good government' clause is well established (remember the AIB case).

Perhaps it would be helpful, to review what has been done so far. The price of oil has risen by nearly ten dollars since the onset of the energy crisis in 1973. A substantial share of the revenues generated by that increase has accrued to residents of the producing provinces.

The increase in the federal share has not been sufficient to fund current federal subsidies of our net imports of petroleum. The resulting drain on the federal treasury and the cost of intergovernmental equalization payments have been principally borne by provinces with relatively large shares of the tax bases of federal revenues.

Windfall gains have been conferred upon non-residents while Canadians have squabbled with increasing ferocity over the division of the domestic spoils. The magnitude of the windfall gains to owners of oil and gas equities is vividly illustrated by a comparison of yields on oil and gas stocks with yields for the Toronto Stock Exchange index of stocks. Over the past ten years the average yield on oil and gas stocks has been 35 per cent; the comparable average TSE yield is just 7 per cent.[4]

If we should move to the world price tomorrow (and I argue below that we should not), and assuming that we eliminate the transfer problem to non-residents that would occur under present tax/transfer arrangements, how can we arrange to compensate the losers?

Full economic compensation in the usual sense is probably out of the question politically (and could conceivably trigger a secessionist movement in Alberta and perhaps throughout the West). Rather, what is required is a set of arrangements for natural resources which are generally acceptable, which deal with the most acute inequities of individuals, and which avoid the type of double ripoff accomplished by present federal/provincial revenue-sharing arrangements.

Under the present arrangements for the sharing of revenues from oil price increases, the producing provinces would get about 45 cents of each dollar increase in the price of oil. If the remaining increase in rents were fully appropriated by the federal government, and if the existing tax subsidies to the oil and gas industry were eliminated (pehaps combined with the elimination of public subsidies of major energy investments), ample funds would be provided to mitigate the adverse effects of the increase in oil prices on the economy by

- compensating those individuals least able to bear the brunt of adjustments to sharply higher energy prices,
- offsetting some of the undesirable macroeconomic changes that would otherwise occur during a long and difficult transition period, and
- providing transition support to industries with large adjustment problems.

As part and parcel of the process of adjustment, the present equalization scheme needs to be altered. As is cogently explained by Courchene in his contribution, the present scheme involves the anomaly that Ontario - a 'have-not' province from the standpoint of resource revenues - is required to pay the lion's share of equalization payments to the poorer provinces arising from an increase in oil prices. Clearly these arrangements need to be changed so that the transfer in this case is from the 'have' provinces - principally Alberta and to a lesser extent, Saskatchewan - to the major 'have-not' provinces - principally Quebec and the Atlantic provinces.

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[4] The annual rate of return (accrued capital gains plus dividends) of oil and gas producers and integrated oil firms over the period 1970-9 averaged 35.5 per cent. For all firms in the TSE index the average return was 7.0 per cent. For the period since the energy crisis (1974-9) the annual yield for all oil and gas firms averaged 36.3 per cent; for all firms in the TSE index it averaged 7.6 per cent. I am indebted to my colleague, Paul Halpern, for providing me with these calculations.

The energy problem is particularly fascinating in having important macroeconomic as well as microeconomic effects, posing difficult macroeconomic choices as well as involving macro/micro tradeoffs. This brings me to my second task: the assessment of the macroeconomic effects.

As is well known the industrial world's macroeconomic performance has changed for the worse over the past decade. Unemployment has risen; realized and potential economic growth have slowed; balance of payments problems have emerged in a number of western industrial countries with consequent exchange rate instability; and inflation has surpassed double-digit levels in many countries and is threatening generally to reach double-digit levels again. The adjustment of the western world to the sharp oil price hike of 1973-4 is not the sole cause of these developments, but it did play an important role. Eckstein's analysis indicates that "the energy crisis was the single largest cause of the great recession" of the US economy of 1973-5 (1978,124). The analysis of the impact of this crisis on the Canadian economy by Jump and myself revealed major adverse impacts upon price levels (up 5.3 per cent), real output (down 3.1 per cent) and employment (down 1.5 per cent) (Jump and Wilson, 1975).

The theoretical analysis of the macroeconomic consequences of large relative price shocks dates back to Schultze's early work for the Joint Economic Committee in Washington in 1957 (Schultze, 1959). Schultze at that time identified and assessed the importance of demand/shift induced inflation. Today, we have witnessed the importance of supply/shift inflation brought about by the establishment of a cartel and the subsequent exploitation of its monopoly power.

The roots of both problems are, first, sectoral asymmetries in price and wage response to upward and downward shocks and, second, downward inflexibility of prices and wages in a large number of sectors of the modern industrial economy.

The consequence of these asymmetries and inflexibilities is that a large increase in the price of a strategic set of commodities (e.g. energy, food) shifts the short-run tradeoff between inflation and unemployment adversely. Macroeconomic policy-makers are therefore faced with the Hobson's choice of validating the inflationary impulse (which will result in the capitalizing of a portion of the inflation shock into the embedded or expected inflation rate) or generating sufficient unemployment to blunt the shock, which would require a restriction of monetary and fiscal policy in response to the shock (and may be totally infeasible for a very large relative price shock).

If the policy-makers do not respond at all, both unemployment and the rate of inflation will probably increase initially. There would occur a fairly prolonged period of higher inflation and higher unemployment, but eventually the general price level would settle down to the level that it otherwise would have had, i.e. prices are inflexible but not totally rigid, and hence a prolonged period of unemployment will eventually reduce prices in other sectors below levels that would otherwise prevail.

Does the speed of adjustment of enery prices matter? The typical response of wages to deficient demand conditions - as represented by the typical short-run Phillips curve - is that as the unemployment rate increases, a larger increment to that rate is required to achieve a given reduction in wage inflation, that is, an increase in the unemployment rate from 5 per cent to 6 per cent causes a larger reduction in the rate of inflation than an increase in the unemployment rate from 8 per cent to 9 per cent. With this type of response the degree of the adjustment of the wage/price system to an exogenous shock of a given magnitude depends to some extent on the length of the adjustment period. Consider, for example, the problem of adjusting to a 5 per cent shock to the price level. If this were phased in over ten years (at a rate of one-half of 1 per cent a year) an increase in unemployment rates of about 1 per cent above the natural unemployment rate would be sufficient to offset the inflationary impact. However, if the shock occurred over a two-year period (i.e. an increase in inflation of 2½ per cent a year), an increase of 5 per cent in the unemployment rate for one year would offset only half the inflationary impulse.[5] Hence the total amount of unemployment - measured in total man-years for the ten-year period - is greater in the case of the sudden shock.

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[5] This calculation is based on the wage equation in the FOCUS model reported in Wilson and Jump (1979).

Now suppose that instead of adjusting to the shock by increased unemployment, the inflationary shock is validated at a given level of unemployment through monetary expansion. In both cases the transitory shock leads to an increase in the embedded or expected inflation rate. In the long run the rates of inflation reached and embedded are the same, but the price level that results is higher in the case of the sudden shock.[6]

Hence, whether one measures the macroeconomic adjustment problem in terms of unemployment rate or general price inflation, the wage/price system is more readily able to adjust to a small but persistent relative price shock than to a brief but large relative price shock.

The final macroeconomic issue I want to comment on is the so-called recycling problem. This problem may occur when the producing provinces (or countries) do not increase their consumption or real investment in full proportion to their increase in incomes but instead acquire financial assets.

The recycling problem has two dimensions: first, an increase in the aggregate propensity to save resulting from the real income transfer, with possible short-term reductions in real aggregate demand as a result, and second, an increase in the required level of financial intermediation in order to channel financial savings from the producing provinces (countries) into appropriate increases in real investments in other locations.

The first effect is not necessarily a problem; increased investment opportunities may also accompany the change in relative energy prices, and appropriate changes in federal monetary and fiscal policy may offset the macroeconomic impact by reducing the savings rate or stimulating investment.

As for the second issue of financial intermediation, the basic question is whether the increased demand for particular financial assets on the part of the producing provinces or countries may create serious imbalances in financial markets leading to shortages of capital in some sectors and increased required yields on their liabilities. The available evidence within

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[6] In a wage/price system where price expectations have a complete effect on wage inflation in the long run, where prices are determined by unit costs, and where price expectations are determined adaptively, a given transitory price shock has the same long-run impact on the rate of inflation regardless of how sudden or gradual it is. However, the price level moves up initially more rapidly in the case of a sudden shock and hence remains persistently above the level of prices which would prevail with a more gradual shock. This result is obtained only when monetary policy is fully accommodative in each situation so that there are no adverse effects on unemployment.

Canada reviewed by Campbell in his contribution suggests that this has not been a serious problem. Many financial assets are reasonably close substitutes for one another, and the financial system is sufficiently flexible to accommodate large surpluses in Alberta along with large federal government deficits. Directly or indirectly, Alberta's surpluses are being used to acquire the assets of the deficit sectors, and significant distortions in relative yields have not yet become apparent.

In a recent set of simulations with the Data Resources of Canada model, William Empey (1979) has examined the macroeconomic consequences of a rapid adjustment to world price levels of energy, in detail. His results make sober reading. His analysis compares a simulation in which domestic oil prices are raised to world levels by the end of next year with a control simulation in which oil prices rise by two dollars on 1 January and by one dollar per quarter thereafter. The comparison indicates that the additional oil price shock is on the order of $7/barrel by the end of 1980 and is roughly constant thereafter. The average percentage increases, relative to the control solution, are 27 per cent in 1980 and 36 per cent in 1981, then gradually declining to 25 per cent in 1984. Natural gas prices initially rise less than the price of oil and then track oil prices at a level of approximately 75 per cent of their energy equivalent value (in terms of BTUs).

This energy price shock has non-trivial adverse effects on both real output and inflation in the absence of countervailing policy moves. Real GNP is reduced by 0.6 per cent in 1980 and by 2.3 per cent in both 1981 and 1982. The real output loss brought about by the energy price shock then gradually diminishes to 1.8 per cent in 1984.

Consumer prices are increased by 1.4 per cent in 1980 and by 3.4 per cent in 1981. The impact on industry selling prices is somewhat larger, with a peak effect of 4.7 per cent in 1981. Thereafter the rate of inflation moderates, but in the fifth year consumer prices are nevertheless 3.0 per cent above their control value and industry selling prices are 3.2 per cent higher.

The increased rate of consumer price inflation gradually affects wage rates. In the second year wages are 1.3 per cent higher than the control solution, and by 1982 they are 3.0 per cent higher. In the fifth year, the impact on wages is 3.3 per cent. Note that this wage acceleration occurs despite an increase in unemployment rates of almost 1.0 per cent.

The consequences for the balance of payments are interesting. In the initial years the merchandise balance is improved as a result of the relative price adjustments and changes in the level of composition of aggregate demand brought about by increased energy prices.[7] However, after five years the improvement in the merchandise balance is wiped out by the cumulative effects of higher average inflation rates.

The effects of the adjustment in prices on federal and provincial deficits is also interesting. The initial increases in prices results in a decline in the over-all deficits of governments of over $2 billion, the federal deficit declining by almost $900 million in the first year. However, in 1981 and 1982 indexing adjustments reduce sharply the revenues obtained from personal income taxes. It is important to note that the oil price increases do not feed into personal incomes! Combined with the negative effects of reduced real output growth on government revenues and the impact of higher prices on government expenditures, the over-all reduction in the government deficit is wiped out by the fourth year. This means that the combined deficit of the federal government and the deficits of the non-producing provinces increase sufficiently to offset the increase in royalties and tax revenues of the oil and gas producing provinces.

Empey's model involves an adjustment to world prices over the four quarters of next year in comparison with a control solution which already incorporates a quite rapid upward adjustment of oil prices towards world levels in the mid-1980s. These adjustments are imposed on an economy which would be experiencing a fairly high rate of inflation in any case. The range of inflation rates expected over the next five years is about 7 to 8 per cent a year. Furthermore, if the unemployment effect were offset by compensatory policies, the increase in the inflation rate could be even stronger, although this would depend on the form of compensation policy - sales tax reductions being superior to expenditure increases in this respect.[8]

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[7] One limitation of these simulations is that no allowance is made for a reduction in real imports of crude oil when the price is increased, that is, the implicit demand for crude oil has a zero price elasticity. This may not be a bad approximation in the very short run, but over five years one would anticipate some reduction in demand for crude oil, particularly if natural gas prices do not rise by the same percentage. Hence the improved balance of trade results and the dollar will likely be stronger, with more offsets to inflation in the future as a result, but with somewhat steeper unemployment affects.

[8] In alternative simulations Empey (1979) examined the efficiency of a federal sales tax reduction to blunt the aggregate demand effects of the oil price increase.

This comparison is between two patterns of adjustment to world oil prices: an adjustment taking place over five to six years and an adjustment occurring within one year. From a macroeconomic standpoint the first policy is clearly preferable. What would we lose on the microeconomic front from the adoption of a phased rate of increase? I assume that in either case we have solved the problem of wealth transfers to non-residents, since otherwise it would be desirable to leave the price where it is.

I think that the efficiency losses involved in the first policy would be small and that any remaining losses could in any case be minimized by appropriate offsetting tax/subsidy policies. Why do I think this? It is well known that the adjustment of the economy to a sharp increase in energy prices will take a considerable period of time,[9] because a lot of energy inefficiency is embedded in existing capital, which will be replaced by more efficient capital only as the capital stock wears out. Even in those cases where the existing capital is made obsolescent by the increase in energy prices, long lead-times may be involved in the construction of replacement facilities. Most conservation and energy development investments represent projects with either long lives and/or long lead-times. If I know now that the price of fuel oil will be at world levels in 1985, it may induce me to install as much insulation this year as I would have installed if I had known the price of oil would go to the world levels in 1980!

Hence, a firm commitment to higher future prices (perhaps to a moving average of world prices to smooth out fluctuations), embedded in formal federal/provincial agreements, would do much to ensure that appropriate production and conservation investment decisions are made now.

There will remain the residual problems of individuals' postponing conservation investments until the price of oil gets high enough and purchasing one last gas guzzler before the price of gasoline reaches the appropriate level. How can this kind of behaviour be deterred? Basically the strategy should be to implement temporary tax and subsidy arrangements designed to face individuals and firms with the same rates of return from conservation or development investments as they would have faced under an immediate adjustment to world price levels for oil.

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[9] On the supply side, major energy development investments such as hydro and nuclear electrical generating facilities and tar sands plants require long construction periods. On the demand side, the price elasticity of demand is greater in the long run, when plant and equipment and household capital are replaceable, than in the very short run, when firms and households are largely constrained by their existing capital stocks.

Specific examples of such policies already exist, such as the 7 cents a gallon excise tax on gasoline and the home insulation grants program. A concerted effort to offset the resource allocation inefficiencies involved in maintaining oil prices below world levels, however, would involve a much more extensive (although temporary) tax/subsidy program. If such taxes and subsidies were incorporated within the framework of the existing excise and income tax systems, they would not have to involve any significant increase either in bureaucracy or red tape.

We have already seen that there are sound reasons for deferring or moderating increases in oil prices - to avoid undesirable income and wealth transfers and undesirable macroeconomic side effects. The former problem can be dealt with by a tax structure designed to recapture rents that would otherwise accrue to non-residents; the latter problem presents a stronger argument for a gradual adjustment to world prices than for an indefinite postponement of price increases.

For some time the Ontario Government has argued against adjusting Canadian prices above US levels on the ground that the international competitive position of Ontario industry would be harmed. At first glance this argument appears to be yet another example of protectionism in disguise; any industry benefiting from a direct or indirect subsidy would naturally find its competitive position worsened in the short run if impediments to free trade were abandoned. At that level the Ontario proposal represents an understandable, but not particularly convincing, special-interest argument. However, there is a more compelling case for the Ontario position. US energy policies have introduced a set of serious market distortions, which could induce inappropriate location decisions north and south of the Canadian border. It may therefore be in Canada's interest to neutralize or partially neutralize the distorting locational effects of US policies by acting to ensure that energy costs north and south of the border are roughly comparable - as indeed they would be under unregulated free-trade conditions!

While there may then be some merit in the Ontario government's argument, in practical terms it will likely prove to be of only passing academic interest. The prevailing US price is already well above the Canadian price, and changes in US energy policy will likely involve raising the US price to world levels by 1982.[10] Under these circumstances, imposing the constraint that the Canadian price must remain below the US price will hardly represent a serious limitation on the scope of Canadian energy policies.

WORLD ENERGY PRICE OUTLOOK

With the US economy once again in recession, with the post-Iranian oil price increases and gasoline shortages major contributing factors to that recession, and with the economies of our overseas trading partners experiencing slow growth as they adjust to higher energy prices and to the US recession, we must question whether this is the right time to administer yet another major adverse shock to the Canadian economy in the face of sharply higher domestic energy prices. Furthermore, the decision whether or not to adopt a world oil price target logically should also depend on the anticipated rates of change in world oil prices. A once-and-for-all adjustment, or a phased once-and-for-all adjustment, to the existing price level is one thing; an open-ended commitment to take whatever OPEC dishes out is another.

Even in the absence of new major supply shocks - which must remain real possibilities in view of the unstable political environment of the Middle East - the medium- and long-term outlook for world oil prices is not favourable. The energy group at Data Resources Inc. in the United States is projecting real relative increases in oil prices of 3.6 per cent a year for the next decade. Measured in terms of nominal US greenbacks, world oil prices are projected to rise 10.4 per cent a year over the decade.[11] Recent Project LINK simulations would imply a similar path for nominal oil prices over the first half of the decade.[12]

If the DRI forecasts come to pass, they would imply a world oil price of just over $60 US in 1990. Would we want an open-ended commitment to follow such price increases in Canada if they were to occur? Suppose, further, that sometime in the 1980's yet another supply crunch occurs, with an additional price shock comparable to the 30 to 40 per cent runup of the past year. Do we want also to absorb such sudden increases?

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[10] For a discussion of US energy policies in the context of long-run forecasting, see Data Resources (1979)

[11] Ibid., 15 and Table II-12

[12] Based on an examination of the simulations reported in LINK (1979).

I do not know the answers to these questions. But I can suggest how to go about arriving at them. First, we need to estimate the real price of oil at which large-scale synthetic and unconventional production becomes economically viable. Once the OPEC price reaches or surpasses that level, that is, the level at which the long-run elasticity of unconventional supply becomes large, then the OPEC monopoly prices become unsustainable in the long run. Hence it would be counterproductive to adjust domestic prices to these unsustainable levels from the standpoint of encouraging efficient investment and locational decisions.

Second, we need to appraise carefully the deadweight loss involved in subsidizing oil prices below world price levels against the macroeconomic losses from higher inflation and/or lower real output and higher unemployment. The tradeoffs involved may mean that subsidies for some considerable period of time may, on balance, be desirable.

Finally, we need to have federal/provincial agreements in advance on how to adjust to the next oil price increases should they occur. This would involve, first, agreement on the division of rents from future oil price increases; the past division of rents is not necessarily the best guide to an appropriate future division. Second, the timing of any necessary adjustments of domestic oil prices to world oil prices should also be planned in advance, taking into account the estimated benefits and costs of temporary subsidies which blunt the macroeconomic effects of the shocks.

Let me close by paraphrasing the historian's credo. Those who ignore the lessons of history may be condemned to relive it. We ignore the lessons of 1973-4 and of 1979 at our peril.

Discussion

QUESTION: In arguing that we should have a gradual movement towards world price levels because of the various macroeconomic effects, it seems to me that the countries with strong currencies at least took the shock immediately. The ones that didn't take the shock are the problem countries, Canadians, the Americans, the British, and probably the Italians. I grant that the unemployment/inflation tradeoff may be different in Switzerland because they can simply cancel guest work or visas. In Canada in 1973 we felt we were beyond economics in some sense; there was a euphoria that as long as energy prices increased we could use our domestic energy to get a preferred advantage, and we never made an adjustment. We even instilled in our citizens the expectation that we didn't have to adjust. Ministers of the Crown were stomping the country saying we can index this, we can index that, and Canadians began to feel we could index ourselves out of this thing. We never realized that it is a once-and-for-all drop in the cost of living for consumers. At some point we have to realize that. What you are telling us is that we should go gradually again, but we have to face the reality. I think we are postponing it, thinking that all the problems can be rectified by proper legislation. Let me ask you a simple question: if you were an energy czar would you have gone to world prices in 1973?

TOM WILSON: I agree that in many respects our problems began in 1973. I guess I would have phased it out: I wouldn't have absorbed the shock. At the same time I think I would have made a firm commitment, which was not done. There are some serious adjustments ahead, at least in central Canada and Eastern Canada. On average in Canada there is no income effect because on balance we are a little ahead on exports, and that is another part of the problem. On the monetary front I certainly would not have been as expansionary as they were at that time. Looking back with the wisdom of hindsight I think the phased adjustment was desirable. It is very difficult to compare different countries. Japan, for instance, is now at double-digit inflation rates again, so I don't think that country is any example. Germany and Switzerland have not had an unemployment increase because they simply sent the Turks back home again.

The key question is how expectations adjust. Would everyone here say, well, the price level has gone up 5 per cent this year, but I am not going to go out and lean on my employer or my union or my faculty association to get another 5 per cent because I recognize that is an oil price increase and I've got to take my lumps? Of course if I read that the Bank of Canada increased the money supply then naturally I would go and get my nominal increase. If people indeed behaved like that then there would be no inflationary consequence of a relative price adjustment; but I don't think they behave that way. Individual firms do distinguish the separate causes of inflation, but in forming their expectations I don't think they can be that sophisticated. So inevitably there is some adjustment.

I think what I would recommend at the moment is a very tough policy of making people face the realities of this. I don't think we can say that adjustments to large relative price shocks have no inflationary implications. If we were like Germany or Japan we would have very little choice. But Canada does have some opportunities precisely because we are not a net energy importer.

I guess in the long run I am basically prepared to go to world prices, but I am very leery about an open-ended commitment. We would never accept a province assuming power over resources, establishing a cartel, and jacking up the price to whatever the demand curve would bear; that would be considered unacceptable. So I am a little cautious about saying we are going to make an open-ended delegation of that kind of power to a part of the world where these decisions are very unlikely to be made purely on economic grounds. These are instruments of warfare by other means. I do not think we want to adjust in lock-step; I think we must have some planning. I do agree, however, that if we are looking at a permanent oil price level of a certain height we are eventually going to have to adjust to it one way or another. There will be important transition difficulties that we cannot ignore.

QUESTION: I was extremely interested by the short-term aspects of your macroeconomic models, in terms of tradeoffs between inflation and employment, of a gradual versus a sharp adjustment to world prices. At the Science Council we have attempted to adopt a longer-term view of the actual incentives for the exploitation of alternative natural resouces. We cannot ignore the necessity of going full steam ahead in exploring alternative energy sources. Of course normal economic incentives may well be insufficient to encourage investors to tackle this sort of problem and engage in high-risk, long-term efforts of exploration. I refer to a number of energy sources ranging from fossil fuels to nuclear power, frontier oil, and so forth. My question is this: does your macroeconomic model take into account the effect of a gradual rather than a sharp adjustment to the world price in acting as an adequate stimulus to the exploration of these alternatives?

TOM WILSON: I agree that the matter bears serious consideration. The simple answer to the question whether the macroeconomic model takes that into account is no. But that kind of very long, forward-looking decision, whose effects are very long delayed, will like a lot of research, have its payoff fifteen or twenty or more years later. And those decisions, if made privately and purely on the basis of an economic calculus, would not be affected by whether we adjust to world prices over five years or ten years. I do believe that the research involved should be funded publicly or heavily subsidized publicly. In other words where the knowledge will go into the public domain and have applications in a number of areas, where the social fruit of the research cannot be captured by the private individual who carries it out, the case for the public subsidizing or carrying on such basic research is very strong. However, the risk is that the public will be conned into funding very large scale research projects that benefit private individuals and corporations. We have to look carefully at the division between research that goes into the public domain and has these kinds of externalities and private development, where the taxpayer is underwriting all the risks and the private owner gets all the benefits.

QUESTION: I feel that we should move within two years to world energy price levels. I do not understand the distinction between Germany and Canada. You said that Germany had to accept oil increases because they are net importers whereas Canada does not have to. That does not make sense to me because Canada will soon be a net importer of energy and there is some price at which Germany can be self-sufficient in energy. Why does Germany's econometric model say that moving to world prices is the correct thing to do but Canada's model says it is not?

TOM WILSON: I am not sure Germany's econometric model says that. The differences between Germany and Canada are so large. Germany has a very conservative fiscal and monetary policy; they are able to export their unemployment. With a relative price shock of any kind you might decide either to put a subsidy on the commodity or reduce indirect taxes. With a temporary price impulse, reducing indirect taxes or putting on a temporary subsidy will help you avoid the macroeconomic difficulties. In the Canadian case instead of subsidizing energy we might subsidize all goods and services. We could have let the price go to world levels and abolished the manufacturers' sales tax for example or made some phased adjustment. From a macro standpoint alone I think that might have been adequate. But it would have involved a much larger cost for the federal treasury and of course much larger surpluses in Alberta. In Canada you can't separate the macro effects from the effects of the interregional transfers of income and the taxes. So I think it is understandable that the decision on subsidies be in that direction.

If the Americans had moved immediately to world prices the case would have been stronger for an instant adjustment here, because that's 70 per cent of our trade. You can argue as I did on second-best grounds that our policy is in a sense neutralizing the distorting impacts of U.S. energy policies. If I had to choose between going to the world price now on the present tax transfer arrangements and leaving things the way they are, I would say unequivocally leave things as they are. Canadians collectively are clearly better off; there is a macroeconomic cost to adjusting, and the transfer cost to non-residents is greater than the efficiency gained. It comes down to that kind of welfare calculation. The first-best solution may be to design a system to extract the rents á la Hartle or Waverman and then go to world prices.

QUESTION: That statement is based on your 'back of the envelope' estimates of elasticity of demand and supply?

TOM WILSON: Well I took Len Waverman's estimate and doubled it, or more than doubled it. I was making a very conservative estimate. But I think that by any reasonable calculation under present transfer arrangements we're not better off. The scenario can be explored further because the elasticities have a wide range of error. On the other hand if we decided that microeconomically we'd be better off at world prices, there would remain this very real macroeconomic problem; over a five-year period at 2 per cent GNP that's non-trivial; you've got to have a big area for those triangles to offset that. Now you could argue that with rational expectations there would be no problem; but with rational expectations there would be no unemployment problem anyway.

QUESTION: Could you tell us a little more about the macroeconomic model; what happens when you increase the price of oil? Is there increased energy investment, or what happens to that $8 billion? Does the model have an energy supply equation in it?

TOM WILSON: It doesn't.

QUESTION: And what would happen if you had an elasticity of demand different from zero in the model?

TOM WILSON: You would have different effects. I asked a colleague who had done some analyses with differing elasticities whether any of these results have been changed, and he said no; there were minor changes, but the elasticities are not big enough to offset it significantly. These models are to some extent poorly designed. If you sit down with a simple model and write out what you think are reasonable wage and price equations and, dealing with that sector in isolation, start administering shocks to the system, you get similar answers with very different econometric models. So you have to make a leap of faith to complete, fully rational expectations, and I mean fully; if the CPI goes up by 1 per cent this month everybody has to say 'nothing to worry about; it's all energy' and forget about it in next year's wage negotiations. If they don't do that then you are going to have this kind of problem. The basic models we are working with are adaptive expectation models. Maybe we are going to get a different impact, or if we think there are differing expectations when we have large relative price shocks then it is incumbent upon us to find them out, seeing whether in fact people do adjust their expectations accordingly.

QUESTION: You said that the difference between moving slowly to world price levels and moving quickly is that there would be some minor efficiency loss because people buy gas guzzlers for an extra year. I question whether the efficiency loss is as small as you think it is. If we compare new car purchases in Canada and the United States since May 1979 we find an enormous difference because of the different rates of increase in the price of gasoline in the two countries. If we consider having taxes and subsidies, more intervention by government instead of a market mechanism, we can look at the home insulation program. The number of households that have taken up the government's offer is I think on the order of 15 per cent of those eligible for the grant. In view of those two pieces of information I find it difficult to believe that efficiency losses in extending the transition are small. I would think that those efficiency losses are in fact very, very substantial.

TOM WILSON: Well, 'substantial' then as a percentage of GNP; one man's small may be another man's substantial. 2 per cent of GNP is a big number, I agree. I think they are small because the estimated price elasticities are low. Those estimated price elasticities have a wide margin of error, which is why I added that insofar as there are any problems I think they can be dealt with by a change in the tax transfer system. We can all pledge our allegiance to the price mechanism. I believe in it too. I don't like bureaucracy. But there are systems that exist; we have a sales tax system, and an income tax system.

QUESTION: We also have a price system.

TOM WILSON: Okay, we have a price system. Now you've caught up with one of the gas guzzlers that has been commented on.

I think the fact that U.S. energy policy is in such a mess, that they had gasoline lines, had much more to do with the change in the composition of demand at a given set of prices. When Canadian prices were higher Canadians still bought gas guzzlers. Maybe there are different priorities among Canadians. The price of gasoline isn't lower in Quebec, but Quebeckers like big cars, whether it's distance, whether they substitute cars for home ownership (everyone is laughing, but home ownership levels in Quebec are extraordinarily low relative to Canadian standards). I don't think we should read too much into what has happened.

There are some efficiency losses, and we can disagree on what they are - using words like 'big' and 'small.' They may be substantial enough that we should do something about it, but that doesn't mean immediately going to world prices because there are other ways of dealing with the transition. The macro costs involved as well as the transfers mean that we have to look at things carefully. Even Adam Smith said that defence was more important than opulence, and we are dealing here with an area that I think borders on issues of national defence.

QUESTION: You gave us some model results from your DRI model. There is a difference of opinion whether a single shock in a commodity price or a gradual approach to a higher price (for example if it were perceived in Canada that energy prices in Canada were going to go to world levels over five years) would result in a higher inflationary impact. Some economists in the United States argue that a one-time shock results in a lower inflationary impact over time than a perception of gradually increasing prices, because in that case labour unions and other people tend to build this into their cost options over time. Secondly, you said that the benefits to Canadians from a one-time move to higher energy prices, whether U.S.

prices or world prices is irrelevant, are less than the cost to Canadians because the benefits to non-residents would outweigh benefits to residents. This led you to the conclusion that any increase in prices of Canadian energy was undesirable. That seems to me the wrong way of looking at it. The correct approach is to look at both problems at the same time. Let's have prices on sound economic grounds, and, let's also deal with the non-resident problem at the same time.

Thirdly, and I think Professor Hartle's paper outlined this brilliantly, the problem in Canada is that we can't separate the equity problems from the political problems. Canada is held together by artificial east-west trade flows. Economically the size of the pie would be greater if we told Alberta to sell all its resources at world prices. But that would not get at the distribution problem because other provinces in Canada clearly come off second best in this sort of solution. It seems to me that this is the crux of the problem. I think Dr Hartle is right, that we have a constitutional problem in Canada and the constitutional problem raises the question of the price we are willing to pay in economic efficiency for Canadian unity.

TOM WILSON: Let's postpone the third question, which will be dealt with tomorrow. First, as to why not deal with prices and non-residents simultaneously but separately: fine, if we can solve them simultaneously let's do it; I have no objection to that. My point is this that many people have talked about going to the prices that prevail without interference, the kind of recipe economists are used to reciting. In this case the recipe doesn't work unless we make some other changes, because of the distortions already there. Once you have transfers of rent outside the country then the normal welfare economics calculus does not apply unless you are able to tax away those rents, by a bidding arrangement or whatever. If you can do that and go to world prices at the same time, fine, you have solved that part of the problem.

But there remains the macro problem. Everyone supposedly says 'Oh yes, 10 per cent this year, so I don't react to it,' but if it is half a per cent over twenty years I am going to react. I don't see any logic in that. Virtually every wage equation that has been estimated shows a non-linear response of wage inflation-unemployment. It is very very hard to offset large inflationary shocks by increasing the unemployment rate; a smaller shock can be treated that way but not a large one. I did some calculations but gave up on them because I thought nobody is going to go that high.

The wage equation question suggested that even 11 per cent unemployment wasn't enough for a 2½ per cent shock.

So you have to have some very peculiar notion of how expectations are formed to say that once people recognize the source of the problem as energy somehow their expectation will be different if the shock came all at once or gradually. If anyone wants to argue that way I'd like to see the evidence. In the Western economy right now generally, perhaps except for Switzerland and Germany, when an inflation shock hits it very rapidly some portion of that shock tends to be captured in the embedded inflation. We could get rid of it. If we really hung in there and only expanded the money supply in line with potential GNP, eventually the inflationary shock would dissipate. But there would be a very long period of high unemployment and lost real output, and we are not prepared to accept that. So it isn't the case that we can lightly accept inflationary shocks and say that the macroeconomic problem is solved by dealing with the money supply. We can solve the inflation problem, but only at the expense of a prolonged unemployment problem. If we do not want an unemployment problem, which is basically the decision the federal government and a lot of other governments have made, then we shall have a higher expected inflation rate. I think that is the choice we face.

QUESTION: You have painted two alternatives for Canadians: the quick shock of going immediately to world prices and the alternative of going gradually to world prices. It seems to me there is a third alternative, namely, staying where we are, or perhaps even reducing prices. What we have gone through in the last six years is a 400 per cent increase in the wellhead price of oil and a 900 per cent increase in the wellhead price of gas. How greedy can you get? It's incredible to me that the Canadian government has accepted these tremendous price increases, and we see them reflected in the rates of inflation, which since 1974 have been over 9 per cent as compared with national rates of inflation of 2 to 3 per cent in the sixties and early seventies. I think it is obvious that energy prices and these incredible price increases are the root cause of the tremendous price inflation that is destroying the country. We are discussing whether to get shafted quickly or slowly without looking at the alternatives of trying to manage our affairs and our resources in the national interest. Professor Waverman's suggestion of going to world prices overnight is an increase in wealth to the oil industry and the provincial governments with a little bit spilling over to the federal government, of $180 billion. I fail to understand the logic of this when we are already paying ten times cost for the resources we are getting. What has happened, it seems to me, is that the focus of the energy question has somehow been switched to energy pricing rather than to energy supply. Canada in the eighties and beyond will be in terrible shape for energy because we exported so much oil and are continuing to export so much gas. The outlook is really disastrous for the country, and here we are talking about a $180 billion giveaway.

TOM WILSON: Let me just say that my $7 billion was the annual revenue flow, and I think you are valuing the stock, which certainly dramatizes the problem. It's a difficult question. Economists do focus on price. But I think that given the cartel there is nothing we can do about it and nothing the Americans can do about it.

QUESTION: Why don't we do what Mexico or Venezuela does?

TOM WILSON: Well I don't know what they do. We sell our stock overseas, so let's maximize our revenue. I don't think anyone quarrels with that. If we are selling to someone outside, let's sell it at world prices. The Mexicans got a better deal; we'll get a better deal next time; nobody is going to quarrel with that.

But what is the sensible domestic price? If we were looking at a stable world price then once the Americans adjusted to it we would no longer have the second-best problem I alluded to. They are screwing up locational decisions, so we have to counter that. Eventually we are going to get there, because I believe the price mechanism is the best way of ensuring the right conservation and investment decisions.

My comments really were, first, that we should only go to world prices if we have the transfer mechanisms set right so that we don't make ourselves poor by making non-resident owners rich, and secondly that we take into account the serious transitional cost. I also raised the question about open-ended commitment. We are no more ready to send troops into Alberta to seize the oil fields than the Americans are to send troops into Saudi Arabia. But I ask whether there is any price at which the Americans would be prepared to send troops into Saudi Arabia. I don't think anyone is going to say there isn't. If the Middle East is sealed off from the Western world can we say we are going to take no action? I am dramatizing it deliberately, but if we enter into an open-ended commitment that whatever happens we are going to continue to press for the division of the spoils and if indeed in five years the world price is $100 then it really will start to pinch. The moment we can say we are concerned about low-income individuals, that some people live in shacks that aren't well insulated, that even the homeowner grant isn't enough and homeowners are going to bear the real brunt of adjustment so that we need some system of credits, or subsidies, or whatever, I feel we should do this in a way that will preserve the incentives for conserving energy while we offset the very serious income effects that would otherwise occur.

At a high enough price we all start to become poor, unless we are living in Alberta or Saskatchewan. An open-ended commitment would say that the interregional distribution of income in Canada is essentially determined by decisions made in Saudi Arabia or Kuwait. I am expressing that reservation, but it mainly has to do with distribution. If the price indeed gets to a hundred dollars a barrel, or some other outlandish figure and sticks there and in the long run there is nothing we can do about it then we'll have to live with that and adjust and conserve. But we must keep these issues clear, not jump to the conclusion that today's division of spoils is a guide to the future regardless of what the price is and there is no macroeconomic difficulty in the short run because the Bank of Canada will solve all our problems.

QUESTION: The inflationary damage is not diminished at all by your plan. The adjustments that will take place because we are continuing the import subsidy on top of the mortgage credit and some other measures are driving down the currency and having a major impact on the bond market. If you bought some Canada bonds a week ago they will be down two and a half points from par. As the import subsidy and other measures enlarge the deficit and shake the faith in Canadian money management in Zurich, New York, and elsewhere, we will be facing even greater difficulties. The currency may decline further and more inflation will be imported that way. So it does not matter whether we do it fast or slow; there will be inflation. With a slow adjustment the inflation may be spread more broadly over more products through the economy but there will still be inflation.

TOM WILSON: I agree that there will be inflation. The question is whether the rate will be higher or lower. What these things mean on the exchange rate is very complicated. In the simulations of going to world prices the dollar appreciated a little for a while, and then it dissipated. I don't know whether to have faith in that result. I am sure with a different model you would get a different result because these are mixed effects. If in fact the aggregate inflation rate does go up, that's a negative effect eventually;, or if they subsidize and don't offset it with other taxes then of course there is a higher deficit and that in and of itself is demand inflationary. But the subsidy on the other hand is classed as deflation. So it is not as simple I think as your question implies.

On balance, for given sizes of deficit - and after all we can raise either taxes or cut expenditures - we have a severe expenditure restraint program in this country. Though it isn't showing up in the figures yet, it is severe enough that the anticipated increases in the federal deficit that would normally occur in a period of recession are not going to occur. With that kind of policy we have an offset for a subsidy, so I think a federal subsidy in the short run would help block the effects.

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The Invisible Hand: The Pricing of Canadian Oil Resources

Leonard Waverman

INTRODUCTION

In 1776 Adam Smith published a monumental book which was to promote a revolution in the economic way of life of the then known world. Among the major tenets of Adam Smith's work were the role of price, the operations of the marketplace, and the 'invisible hand.'

In to-day's oil and natural gas markets we have forgotten the important underlying concept of price and its role in promoting economic development and economic efficiency. The pricing of oil and natural gas has become a vehicle for taxation and income redistribtution rather than a guide to efficient resource allocation. In this paper I examine the present administrative mechanism in Canada for pricing petroleum supplies, against the alternative of a functioning market system. I discuss the 'correct' price to be charged within Canada for oil and natural gas; the impact of pricing on demand and conservation, on the competitiveness of industry, and on the supply profile of these important natural resources.

PRICE AND THE INVISIBLE HAND

Adam Smith's concepts of the role of price in determining demand and supply can be found in chapter 7 of Book 1 of The Wealth of Nations:

> When the price of any commodity is neither more nor less that what is sufficient to pay the rent of the land, the wages of the labour, and the profits of the stock employed in raising, preparing, and bringing it to market, according to their natural rates, the commodity is then sold for what may be called its natural price ...

My thanks for helpful comments go to Meyer Bucovetsky, Donald Dewees, and Campbell Watkins. All errors, flaws and inconsistencies are, of course, my own responsibility.

> The market price of any particular commodity, though it may continue long above, can seldom continue long below its natural price. Whatever part of it was paid below the natural rate, the persons whose interest it affected would immediately feel the loss, and would immediately withdraw either so much land, or so much labour, or so much stock, from being employed about it, that the quantity brought to market would soon be no more than sufficient to supply the effectual demand. Its market price, therefore, would soon rise to the natural price. This at least would be the case where there was perfect liberty.

The workings of the competitive market were described in Book IV, chapter 2;

> But it is only for the sake of profit that any man employs his capital in the support of industry; and he will always, therefore, endeavour to employ it in the support of that industry of which the produce is likely to be of the greatest value, or to exchange for the greatest quantity either of money or of other goods ... He is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it.

Today the oil and natural gas markets in Canada are not ruled by the invisible hand of market forces. Instead the visible hand of a few politicians acting in the best interests of their own specific constitutents controls the price of fluid hydrocarbons. The rent from mineral rights is fought over by warring jurisdictions: the major oil and natural gas producing provinces (British Columbia, Alberta, Saskatchewan), the major consuming energy provinces (Ontario, Quebec), and the federal government. The Canadian market prices of oil and natural gas are held below world price levels, the relevant 'natural' price levels, in order to benefit consumers. These price ceilings have the deleterious effects on supply and demand clearly established by Adam Smith over two hundred years ago. The governments of the western provinces have greatly increased the royalty payments for production rights and have repeatedly clashed with the federal government on the appropriate division of the economic rents from oil and natural gas production. The federal authorities subsidize imported oil to maintain a single price (plus transportation costs) across Canada. The exports of oil (but not natural gas) from Canada are subject to a federal export tax which helps defray the costs of subsidizing imported oil.[1]

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[1] A recent paper by John Helliwell ('Canadian Energy Policy,' in Annual Review of Energy, 1979 contains an excellent description of the devel-

Politicians are not foolhardy; real constraints force them to ignore the economic realities of the role of price. These constraints are partly constitutional, lying in the British North America Acts of 1867 and 1930. The major constraint preventing the full use of the market today, however, is self-interest as practised by governments. The very force that Adam Smith felt would minimize distortions in the economic system has become the source of distortion.

The overriding concern in the pricing of oil and natural gas is regional income redistribution. Provinces with large reserves of oil wish to capture the rents they say are due them for their depleting birthright. The major consuming provinces argue that their economies will suffer much harm, if large amounts of revenue are transferred to the oil-rich provinces. The have-not provinces would like the wealth of the oil-rich west to be partially distributed to them. The constitution gives the power, including the power of direct taxation, to the owners of the natural resources. The federal government, with its powers over interprovincial trade and to act in support of peace, order, and good government, attempts to reconcile the various demands, including its own needs for tax revenue.

It is therefore not surprising that the concept of the correct pricing of Canadian hydrocarbon supplies has given way to arguments over the taxing of these resources. Price changes are really poorly disguised changes in excise taxes. Excise taxes, unlike market equilibrium prices, are economically inefficient; they distort demand and supply responses. The market price of oil, $15.00 a barrel in Toronto, is well below the 'natural' price or world price, $26.Can.[2] This per barrel differential in favour of consumers is an excise subsidy that exaggerates demand and prevents conservation. Because of the royalty system, for each barrel of

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opment of policies and a number of tables outlining the relevant prices and taxes for oil and natural gas. In 1977 according to Helliwell, the Alberta government received $2.1 billion in production royalites on oil and gas (of a total industry revenue of $7.5 billion). The federal government in the 1976-7 fiscal year received $660 million from the oil export charge, $558 million from a special gasoline excise tax of 10¢ a gallon, and $862 million from the corporate profit tax. The federal government spent $945 million in subsidizing imported oil and $484 million in equalization payments related to oil revenues.

[2] The exact average world price is difficult if not impossible to measure. The average landed price of imported crude into Montreal in July 1979 was roughly $26 Can.

oil they sell producers receive, on average, not $13.75, the wellhead price, but $6 to $8.[3] The royalty as an excise tax diminishes the supply of oil found in Canada. The export tax on oil is an excise tax too and therefore also reduces incentives for producers.

I propose that Canadian oil prices be increased within two years to $24 a barrel (10 per cent below world price levels to accommodate increases in the foreign exchange value of the Canadian dollar)[4] and that income taxes or net royalties rather than the present system of gross royalties become the major rent collection device. I recommend this price increase, subject to agreement by the producing provinces to subsidize those Canadians especially hurt by the rapid escalation. To show the merits of this plan, I must digress to Adam Smith and discuss demand and supply in detail, before placing the two blades of the market scissors mechanism together in an examination of the present administrative mechanisms for pricing of oil and natural gas reserves in Canada.

DEMAND

In 1978 oil and natural gas together accounted for 63 per cent of the primary energy consumed in Ontario, oil 41 per cent, natural gas 22 per cent. The transportation sector accounted for over half the oil but none of the natural gas consumed. Industrial uses took 13 per cent of the oil and 55 per cent of the natural gas. Residential customers consumed 17 per cent of the oil (excluding transportation use) and 21 per cent of the natural gas. The two major users of fluid hydrocarbons in Ontario in 1978 then were the transport sector (primarily automobiles) and industry.[5]

Nominal energy prices in Ontario have nearly doubled since the October 1973 oil embargo by the Organization of Arab Petroleum Export

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[3] It is also difficult to state categorically the exact producers' net as a proportion of the wellhead price. This net is dependent on the province in which the oil is produced, whether the land is held freehold or not, and the amount of net revenue reinvested in exploration and development. The Ontario Energy Review (June 1979) suggests a producers' net of $5.64 of a $12.75 wellhead price (July 1978) assuming that two-thirds of net revenues are reinvested.

[4] If the Canadian dollar were to move back to parity with the US dollar, the world price of oil denominated in US dollars would fall in terms of Canadian dollars. There is little reason to maintain domestic Canadian oil prices above world oil price levels.

[5] Sources for these numbers are the Ontario Energy Review (June 1979).

Countries (OAPEC). The consumer price index has also nearly doubled. To move near world oil price levels now would increase retail prices of oil products by approximately 35 per cent to 50 per cent. Higher prices on one hand promote conservation, the exact magnitude of energy saving depending on the elasticity of demand. Higher prices on the other hand, it is said, inequitably redistribute income and seriously harm the competitiveness of the Ontario manufacturing sector.

The responsiveness of demand to changing energy prices has so far been fairly slow. Since the transport sector is the major user of oil products, it is important to determine why consumers have not adjusted rapidly to changing energy prices. One obvious answer is that gasoline prices have not increased in real terms since 1973.[6] A second reason is that the falling real energy prices of the 1950s and 1960s affected the basic structure of our society - the spread of low-density urbanization, the falling use of rapid transit, the high energy intensity of some industrial production. Responses to higher energy prices in the transport sector may be large, but they will take time, since higher energy prices cannot create a more densely packed urban environment overnight. Slowly, relative land prices in and around cities will adjust to higher energy prices creating changing patterns of urban settlement. For example, a sudden 50 per cent increase in gasoline prices would ultimately lower the price of rural land relative to land at the urban core by the capitalized value of the now higher transportation costs from the city centre to the rural subdivision. A new home purchaser who was indifferent between a home at city centre and a house in the rural environs before the gasoline price increase would be equally indifferent after the gasoline price rise since the relative fall in capital value of the rural, more-distant house would exactly offset the increase in the present value of the gasoline costs. People who already owned homes outside the city would suffer capital losses on sale and pay higher costs for commuting. The impact of this higher gasoline price on the structure of the urban environment would slowly occur as the residential density increased at the city core in response to higher land prices. Such changes in density do not occur in five years, and will not occur at all if gasoline prices do not substantially increase in real terms.

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[6] This calculation is for June 1979 as compared to October 1973 for Toronto (Statistics Canada, Prices and Price Indexes).

Many accounts have been published of the changing distribution of new car purchases, and one American automobile company in particular is experiencing the pangs of producing the wrong size of cars. Yet, statistics indicate that the average automobile and its use has not changed significantly since 1973, largely for two reasons.[7] First, the automobile market, like the land market, is highly organized, with many buyers and sellers. Changes in fuel costs alter the relative capital values of autos by the present value of the change in relative fueling costs. A first-time auto purchaser can therefore buy a used gas guzzler at a price commensurate with its relative fuel inefficiency, receive a rebate on a purchase of a new gas guzzler, or pay fill list price for an automobile of high gasoline efficiency. The impact of higher fuel prices is felt in the asset market for automobiles (as Chrysler Corporation Inc. has found out) as well as in the gasoline market. Since new car purchases are only 13 per cent of the automobile stock in Canada and 10 per cent in the United States, it takes eight to ten years for the average fleet fuel efficiency to change significantly.[8] The US automobile environmental regulations of 1973 through 1975 decreased average fleet gasoline efficiency.[9] It will therefore not be until between 1982 and 1985 that the higher gasoline prices that began in 1974 will have significant effects on gasoline consumption resulting from the use of more fuel-efficient vehicles. This year has witnessed major differences in new car purchase patterns between Canada and the United States. In the latter a 40 per cent increase in the price of gasoline plus shortages since March of 1979 have led to the average 1979 new car purchased being smaller than the average new car purchased in Ontario. Some effects of keeping energy prices in Ontario below their 'natural' levels, then, are that consumers purchase wasteful equipment based on incorrect price signals, urban spread continues, and deficits grow for urban mass transit.

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[7] The scrappage rate in the United States (vehicles retired over vehicles registered) was lower in 1975 and 1976 than the 1966 to 1972 average. Nor did the average fleet efficiency change much over these years. In 1950 the average miles per gallon in the United States was 12.87; in 1970 it was 12.14; 1973, 11.85, and 1976, 12.18 (all statistics from the US Department of Commerce, Bureau of the Census, Statistical Abstract of the United States, 1978).

[8] US data from US Department of Commerce, ibid. Canadian data from Statistics Canada, Road Motor Vehicles Registrations, 1977.

[9] Over-all fleet fuel efficiency increased somewhat, but mainly because of a decrease in average speed (US Department of Commerce, see note 7).

The income distributional effects of price ceilings

I have stated that income distribution is the key to Canadian oil pricing. Oil prices are kept below the world level to help consumers - households and industries in the east (as well as the west) at the expense of shareholders of energy companies and residents of oil-producing provinces. Does this subsidy, however, benefit the poor more than the rich (a progressive subsidy) or is it regressive, benefiting the rich man more than the poor? Little information has been available on the consumption of energy by income groups. Do the poor purchase more or less energy as a percentage of income than the rich? Does the population of the Maritimes consume more or less energy per dollar of consumer expenditure than residents of Alberta?[10]

In the following tables the energy consumption for a sample of urban households by income class and across eleven cities is examined for Canada in 1969 and 1974 (the most recent date available).[11] The tables show the direct energy expenditure, i.e. that on purchased fuel, light, and power (electricity, natural gas, light fuel oil, etc. used to drive appliances and to heat homes and water, and gasoline to power autos).[12] The indirect energy expenditure is also given; it has been calculated by measuring, through the input-output tables, the direct and indirect energy component of a dollar of final demand in each of fifteen components of consumer expenditure in each of the two years.[13] For example, households spend a large proportion of their budgets on food. Energy is directly required byproducers to make the food items purchased by households as final demand, for example, heat to produce bread. The demand for bread indirectly requires energy to produce the inputs necessary for bread production, for example, natural gas to make the fertilizer which is needed for wheat production. The direct and indirect energy component for bread from the input output table includes all the energy needed to produce all the items directly and indirectly required for bread production.

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[10] In an earlier paper I examined these issues by analysing only the direct expenditures on energy for a sample of urban and rural households (L. Waverman, 'The two price system in energy: subsidies forgotten,' Canadian Public Policy (Winter 1975).

[11] The sample in 1974 consisted of 6630 families, 917 with an income of below $4000 and 2177 with an income of over $15,000. The income classes and cities covered changed over the years. Incorporated into this analysis are the income classes for 1969; in 1974 the above-$15,000 class is subdivided into three classes ($15,000 - $19,999; $20,000 - $29,999; over $25,000).

[12] In an earlier draft the calculation had omitted gasoline expenditures. I am indebted to Michael Miloff of Middleton Associates for pointing out the error and for providing other insights as well. Ignored in these data are oil consumption for automobiles, though labour for oil changes is included.

[13] The input-output table in the 'L' aggregation consists of forty final demand commodities in the consumer expenditure category. The Urban Expenditures data uses twenty subdivisions in thirteen categories. The appendix lists the correspondence between the categories in the input/output tables and those in Urban Family Expenditures. I am grateful to K. Lal of Statistics Canada for expediting the required computer runs.

Table 1 shows the direct and indirect energy expenditures for 1969 for a sample of urban households disaggregated by nine income classes. The first half of the Table (1A) gives expenditure amounts; the second half (1B) shows energy expenditures as a percentage of the total current expenditure on all items. Across all income classes in Canada in 1969, an average household spent $1309.98 directly and indirectly on energy. Indirect expenditures (of the kind described in the previous paragraph) accounted for 65 per cent of the total energy expenditure (principally embodied in the food, electricity, fuel, and automobile and truck purchase components of final demand).[14]

The amount spent on total energy (direct and indirect combined) increases monotonically as income increases, as does each of its components, direct and indirect energy expenditures. As a percentage of total current household expenditure, however, direct, indirect, and combined energy expenditures show no consistent pattern (not rising or falling monotonically) when compared across income classes (column 2 in Table 1B). The wealthiest families (those with incomes over $15,000 a year) spend a greater proportion of their income on direct and indirect energy purchases than any other income class. On average, in 1969, urban households spent 18.58 per cent of their current expenditures on energy, 12.03 per cent of this amount indirectly.[15] Energy expenditures (including

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[14] Michael Miloff pointed out to me that the percentage interviewed who did not respond to particular questions appears to be inversely related to income. As a result, the aggregate data may systematically understate the energy expenditures of the poor. In addition, a greater percentage of the poor than the rich are tenants. Heat and electricity would then be part of the rent paid, not a direct expenditure. The input-output calculations do give a value for the direct and indirect energy component of rented property. However, this number appears a priori to be low.

[15] The 'all-class' average of energy expenditures as a percentage of total expenditures has been calculated as the average of the individual class percentage, using population in each class as weights.

Direct and indirect energy expenditures, urban households by income class, 1969

1A

Income Class	Indirect Exp. (1)	Direct Exp. (2)	Total Energy Exp. (3)	Subsidy (25% of expenditures (4)	Amount of Subsidy if at average % (5)	Difference (4) - (5)
All classes	$ 847.91	$ 462.06	$1,309.98	$ 327.50	$ 327.50	$ 0
Under $4000	295.86	133.78	429.64	107.41	108.99	1.58
$4000-$4999	471.83	251.70	723.53	180.88	167.37	13.51
$5000-$5999	488.30	266.20	754.50	188.63	208.73	20.10
$6000-$6999	623.37	366.90	990.27	247.57	227.94	19.63
$7000-$7999	659.36	381.20	1,040.55	260.14	271.38	11.24
$8000-$8999	740.11	456.00	1,196.11	299.03	295.69	3.34
$9000-$9999	785.84	482.50	1,268.33	317.08	336.08	19.00
$10000-$11999	871.01	524.44	1,395.44	348.86	349.99	1.13
$12000-$14999	928.41	570.90	1,519.31	379.83	389.26	9.43
$15000 & over	1,218.70	695.60	1,906.30	476.58	418.66	57.92

1B

Income Class	% Indirect	% Direct	% Total Exp.
All classes	12.03	6.55	18.58
Under $4000	12.61	5.70	18.31
$4000-$4999	13.09	6.99	20.08
$5000-$5999	10.86	5.92	16.79
$6000-$6999	12.70	7.48	20.18
$7000-$7999	11.29	6.53	17.81
$8000-$8999	11.63	7.16	18.79
$9000-$9999	10.86	6.67	17.53
$10000-$11999	11.56	6.96	18.52
$12000-$14999	11.32	6.81	18.13
$15000 & over	13.43	7.72	21.15

NOTE: All classes: weighted average of specific classes (weighted by number of families in class)

Direct expenditures are direct purchases of fuels by household, e.g. electricity, fuel oil, gasoline.
Indirect expenditures are the energy component of a household's purchases of commodities.
% Direct is the direct expenditure on fuels as a percentage of household total current expenditure.
% Indirect is the indirect expenditure on energy as a percentage of household total current expenditure.

SOURCES: Statistics Canada, Urban Family Expenditures, 1969.
Statistics Canada, Input Output Division, special computer runs as requested

indirect transactions) were then a substantial portion of the household budget in 1969.

Table 2 gives the identical information on energy expenditures for 1974. In 1974, on average, an urban household spent $2008.32, directly and indirectly on energy. This amount represented 19.19 per cent of the total household budget, compared to 18.58 per cent in 1969, a perceptible change. Except for the lowest income class (under $4000 in income), there was a shift in the five years in the proportional makeup of energy expenditures, direct energy expenditures decreasing and indirect energy expenditures increasing as percentages of total expenditures. In 1974, on average, indirect energy expenditures represented 68 per cent of the household's total energy expenditures. Combined direct and indirect energy expenditures as a percentage of total household current expenditures show no consistent pattern across income classes.[16]

Since domestic oil and natural gas prices are being held in Canada below their opportunity cost, i.e. world oil price levels, all households are being subsidized. In 1974 an urban household in the income class below $4000 spent $602, or 17.88 per cent of its total expenditures, directly and indirectly on energy. An urban household in the income class above $15,000 spent $2618, or 21.32 per cent of its budget, directly and indirectly on energy. The lowest proportion of expenditure going to energy products (16.4 per cent) was in the $6000 - $6999 income class.

This average (18.58 per cent) is different from the average calculated using the Statistics Canada all-class average multiplied by energy expenditures (15.83 per cent). This Statistics Canada mean is lower than any single class value. This mean value for Table 3 (15.83 per cent) where families are grouped by cities is identical using either method and identical to the Statistics Canada mean for Table 1. I have attempted, unsuccessfully, to trace the reasons for the difference but feel that several of the class values in Table 1 may be incorrect. The 1974 values (Tables 2 and 4) are consistent and central to our findings. Note that the differences in the 'all-class' mean in 1974 are due to the disregarding of several of the cities sampled, i.e. more families are included in the distribution by income class than by city.

[16] Direct and indirect energy expenditures will show a very different pattern as a percentage of income than as a percentage of total current expenditures, since the poor spend a greater fraction (frequently over 100 per cent) of their income in any one year than do the rich. Data in Urban Family Expenditures for 1974 confirm this. The average income of the over $15,000 income class is more than $30,000. However, I feel that current expenditure, not income, is a superior measure of standard of living and is a superior measure for assessing the progressivity or regressivity of subsidies.

Direct and indirect energy expenditures, urban households by income class, 1974

1A Income Class	Indirect exp. (1)	Direct exp. (2)	Total energy exp. (3)	Subsidy (25% of expenditures (4)	Amount of subsidy if at average % (5)	Difference (4) - (5)
All classes	$1,373.21	$ 635.12	$2,008.32	$ 502.08	$ 502.08	$ -
Under $4000	429.96	171.80	601.76	150.44	161.46	-11.08
$4000-$4999	533.71	221.20	804.91	201.22	222.57	-21.05
$5000-$5999	688.13	309.30	997.43	249.35	263.79	14.44
$6000-$6999	667.39	280.80	948.19	237.04	281.84	-44.8
$7000-$7999	772.47	331.00	1,104.36	276.09	326.04	-49.95
$8000-$8999	927.30	426.90	1,354.19	338.55	362.64	-23.79
$9000-$9999	991.82	458.10	1,449.91	362.48	401.15	-38.67
$10000-$11999	1,089.08	501.80	1,590.88	397.72	439.90	-42.18
$12000-$14999	1,309.96	639.60	1,949.56	487.39	502.04	-42.68
$15000 & over	1,769.91	848.48	2,618.38	654.60	589.20	65.4

1B Income Class	% Indirect	% Direct	% Total Exp.
All classes	13.12	6.07	19.19
Under $4000	12.78	5.11	17.88
$4000-$4999	12.58	4.77	17.35
$5000-$5999	12.51	5.62	18.14
$6000-$6999	11.36	4.78	16.14
$7000-$7999	11.36	4.88	16.25
$8000-$8999	12.28	5.65	17.93
$9000-$9999	11.86	5.48	17.34
$10000-$11999	11.87	5.47	17.35
$12000-$14999	12.52	6.11	18.63
$15000 & over	14.41	6.91	21.32

NOTE: See note to Table 1.

SOURCES: Statistics Canada, Urban Family Expenditures, 1974.
Statistics Canada, Input Output Division, special computer runs as requested.

Let us assume that 60 per cent of the urban household's direct and indirect energy expenditures were in oil and natural gas and that all households consumed the same proportion of hydrocarbons in their energy budget. Further let's assume that oil and natural gas prices in 1974 were 40 per cent below world price levels ($6.50 - $7.00 in Canada, compared to $11.25, the posted price of Saudi Arabian light, plus transportation costs). Assume also, for this example, that the elasticity of demand for energy was -1.0. Under these assumptions each household was subsidized by the federal oil and natural gas price ceilings to the extent of 25 per cent of its direct and indirect energy expenditures.[17]

However, because consumers in the lowest income class consumed proportionately only as much energy as the average household, the poor benefited proportionately no more from the subsidy than did the household with average income. Since the rich purchased more energy as a percentage of total current expenditures than those at the average income level, maintaining low energy prices benefited the rich proportionately more than the poor. The amount of the subsidy in 1974, measured as 25 per cent of energy expenditures, is given in column 4. The subsidy to the average household in Canada was $468. The subsidy to each and every household earning above $15,000 in income in 1974 about $654. The overall subsidy to those in the lowest income group (below $4000) in 1974 was $101.46. Column 5 presents the hypothetical subsidy for every income level if energy expenditures as a percentage of total current expenditures were equal across income classes (every household, no matter its income, spent 19.19 per cent of its expenditures on energy). This hypothetical subsidy amounted to nearly 5.0 per cent of total current expenditures for the average income class.[18] In column 6 are shown the differences between the actual subsidy due to ceiling prices on oil and natural gas and this hypothetical expenditure subsidy. A negative figure in column 6 indicates that in 1974 the actual energy subsidy benefited the specific income class more than a proportionately reduction in the prices of all goods consumed. Likewise, a positive number indicates that the income class benefited more from the energy subsidy than from a subsidy based on total expenditures. The results are obvious; only one income group - the rich - substantially benefited proportionately more from the energy price subsidy than a household of average income.

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[17] The subsidy is calculated here as a percentage of family current expenditures. The subsidy would be greater as a proportion of income (rather than expenditures) for the poor rather than the rich since the poor generally spend a greater proportion of their income than do the rich. The data in Urban Family Expenditures give neither total income nor savings by income class. It is unclear whether total expenditure or income is the correct base for determining the impact of the subsidy 'Standard of living' is likely better measured by expenditures than income.

[18] This subsidy would be equivalent to a reduction in a general expenditure tax whose impact was distributed in proportion to energy expenditure in the needier income class.

Maintaining Canadian oil prices below world oil price levels therefore did not redistribute income from the rich to the poor. In 1974 aggregate national data indicate that the rich received, in proportion to their expenditures, $65 (11 per cent) more from the oil price subsidy than did the poor. In absolute terms the rich received much more. Subsidizing energy prices would appear to be a perverse policy in terms of redistributing income.

However, what about the regional distribution of this subsidy? Do the relatively poor regions of Canada - the Maritimes and the Prairies receive proportionately more from subsidizing Canadian oil prices.[19]

In Table 3 are presented the direct, indirect, and direct-plus-indirect energy expenditures in 1969 by urban households in eleven cities. As a proportion of a household's total current expenditures, residents of St John's spent the most on energy (21.90 per cent) and residents of Edmonton among the least (14.45 per cent). This difference is substantial; if residents of St. John's could have spent the same proportion of their expenditure on energy as residents of Edmonton, they would have saved $408 a year.

The 1974 pattern of energy expenditures by households distributed across citites is given in Table 4. Residents in St John's spent 24.8 per cent (up from 21.9 per cent in 1969) of their budget directly and indirectly on energy, or 9.5 per cent more than residents in Edmonton. In St John's, 9.5 per cent of the total expenditure per household amounted to $1032. The difference in energy expenditures as a proportion of total expenditures between St John's residents and Edmonton residents involves innate differences in transportation costs as well as differences in energy mix, provincial pricing policies, and expenditure patterns. Assume, after

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[19] I am not referring here to the subsidy between west and east. Tom Courchene has examined that issue in his paper.

TABLE 3

Direct and indirect energy expenditures, urban households by city, 1969

3A City	Indirect exp. (1)	Direct exp. (2)	Total energy exp. (3)	Subsidy (25% of expenditures (4)	Amount of subsidy if at average % (5)	Difference (4) - (5)
All classes	$ 705.54	$ 404.92	$1,116.10	$ 279.03	$ 279.03	$ 0
St John's	733.05	465.20	1,198.24	299.56	216.53	83.03
Halifax	730.59	419.00	1,149.59	287.40	260.42	26.98
Montreal	703.03	364.80	1,067.82	266.96	264.61	2.35
Ottawa	705.70	419.60	1,125.30	281.33	314.95	33.02
Toronto	748.77	441.60	1,190.37	297.59	319.38	21.79
Winnipeg	655.98	398.70	1,054.68	263.67	246.68	16.99
Edmonton	660.01	380.60	1,040.60	260.15	284.99	-24.84
Vancouver	715.19	420.80	1,135.98	284.00	257.48	26.52
Quebec City	593.72	341.70	935.42	233.86	253.56	-19.7
Regina	678.32	423.30	1,101.61	275.40	231.03	44.37
Saskatoon	632.50	363.90	995.46	248.87	225.63	23.24

3B City	% Indirect	% Direct	Total Exp.
All classes	10.09	5.74	15.83
St. John's	13.40	8.50	21.90
Halifax	11.10	6.37	17.47
Montreal	10.52	5.46	15.97
Ottawa	8.87	5.27	14.14
Toronto	9.28	5.47	14.75
Winnipeg	10.52	6.40	16.92
Edmonton	9.17	5.29	14.45
Vancouver	10.99	6.47	17.46
Quebec City	9.27	5.33	14.60
Regina	11.62	7.25	18.87
Saskatoon	11.08	6.38	17.46

NOTE: See Table 1, note and sources.

TABLE 4

Direct and indirect energy expenditures, urban households by city, 1974

4A City	Indirect exp. (1)	Direct exp. (2)	Total energy exp. (3)	subsidy (25% of expenditures (4)	Amount of Subsidy if at average % (5)	Difference (4) - (5)
All classes	$1,271.68	$ 597.45	$1,869.13	$ 467.28	$ 467.23	$ 0
St John's	1,770.47	935.00	2,705.47	676.37	487.49	188.88
Halifax	1,441.91	679.30	2,121.21	530.30	473.80	56.5
Montreal	1,291.09	574.30	1,865.39	466.35	456.63	9.72
Ottawa	1,317.51	632.70	1,950.21	487.55	532.58	-45.03
Toronto	1,276.82	630.10	1,906.92	476.73	483.72	-6.49
Winnipeg	1,147.93	551.90	1,699.83	424.96	443.54	-18.63
Edmonton	1,123.26	493.80	1,617.23	404.31	471.03	-66.22
Vancouver	1,290.39	597.30	1,887.69	471.92	466.32	11.6
Quebec City	1,231.26	618.70	1,849.96	462,49	454.10	8.39
Regina	1,244.12	541.50	1,785.62	446.41	434.72	11.64
Saskatoon	1,165.30	544.00	1,709.30	427.33	401.90	25.43

4B City	% Indirect	% Direct	$ Total Exp.
All classes	12.15	5.71	17.86
St John's	16.22	8.56	24.78
Halifax	13.59	6.40	19.99
Montreal	12.62	5.61	18.24
Ottawa	11.05	5.31	16.35
Toronto	11.80	5.82	17.62
Winnipeg	11.55	5.56	17.11
Edmonton	10.65	4.68	15.33
Vancouver	12.52	5.79	18.31
Quebec City	12.10	6.08	18.19
Regina	12.78	5.56	18.34
Saskatoon	12.95	6.04	18.99

NOTE: See Table 1, note, and Table 2, source.

accounting for differences in transportation costs, that the amount of oil price subsidy for residents of St John's as well as Halifax relative to residents of Edmonton was 20 per cent in 1974. Residents in St John's would then have received $218 and those in Halifax $101 more in subsidy than residents of Edmonton.

Residents of Ottawa and Toronto spent less on energy than the average urban household, and therefore did not benefit proportionately from the oil price subsidies compared to households in other cities across Canada. The average household in Ottawa and Toronto spent nearly $1950 directly and indirectly on energy in 1974. Assuming again a 25 per cent subsidy on total energy consumption, maintaining oil prices below world levels in 1974 subsidized the typical household in Ontario by approximately $480.

Column 5 of Table 4 presents the subsidy which residents of these eleven cities would have earned had each household across Canada spent 17.8 per cent of its expenditures on energy. In column 6 are given the differences between the estimated actual subsidy and this hypothetical subsidy. The energy price subsidy proportionately benefits those who live in St John's, Halifax, and Saskatoon compared to those who live in Ottawa, Toronto, Winnipeg, and Edmonton. (Residents of Montreal, Vancouver, Quebec City, and Regina are also mildly better off proportionately from an energy price subsidy compared to a total expenditure based subsidy.) The oil price subsidy then does tend to distribute income equitably across regions, the primary beneficiaries (on a proportional basis) being those living in St John's and Halifax. To complete this analysis we would want to examine the distribution of this subsidy across income classes in each region. The data are unfortunately not easily available. However, these observations on the regional distribution of the oil price subsidy do temper our conclusions somewhat about the over-all demerits of the income distributional effects of the energy price subsidy. If the poor in poor regions spend proportionately more on energy than do the poor in wealthier regions, then the oil price subsidy may well prove to be progressive. However, the poor are not poor primarily because of changes in energy prices. While the average household benefited significantly in 1974 from the oil price subsidy ($467) at the expense of producers and shareholders, the available evidence does not indicate that this subsidy benefited the poor more than the rich. Some of the evidence showed the reverse. Why subsidize rich consumers to purchase more energy and hence energy-using devices? Income distribution is an important goal, but it can be achieved at less cost and with fewer obvious inefficiencies by directly subsidizing the poor rather than by subsidizing energy prices. In 1974 a tax credit of $230 for each household with an income below $7000 would have yielded the same benefits to the poor as maintaining Canadian oil prices 40 per cent below world levels.

THE COMPETITIVENESS OF INDUSTRY

How do energy pricing policies affect the costs and hence competitiveness of the Ontario manufacturing sector? For nine industries the cost of total direct fuels used as a percentage of the total costs of production is given in Table 5.[20] These nine industries consumed 85 per cent of the total fuel used in Ontario manufacturing in 1977. For four of the industries (Primary metals, Paper, Non-metallic minerals, Chemicals), fuels represented between 3 and 5 per cent of total production costs. For the other industries fuel costs represented less than 2 per cent of total costs. Also given in the table are labour costs as a percentage of total costs. Note that labour costs are at least five times as great as energy costs for all but two industries - Tobacco (where both costs are small) and Non-metallic minerals (the most fuel-intensive industry).

A recent study for the Ministry of Industry and Tourism has examined the cost structure of all twenty manufacturing industries in Ontario utilizing econometric cost function models.[21] For each of these twenty industries an economic model of the ways in which factors of production (capital, labour, energy, and materials) are combined to produce output was estimated with data for 1961-73. The models were static or long-run equilibrium models assuming that firms can fully adjust to new higher factor prices within one year.[22] In most industries a good deal of interfuel substitution was found (e.g. as the relative price of coal to oil rose over

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[20] Not included as fuels are energy feedstocks used as materials. In some industries (chemicals, petroleum refining) the feedstock use of energy is very important. Because of this omission the results underestimate the impact of higher energy prices on production activity.

[21] M.G.S. Denny, M.A. Fuss, and L. Waverman, 'The cost structure of manufacturing industries: development and empirical testing of dynamic adjustment models of factor-demands in Ontario's manufacturing sector,' report to the Ministry of Industry and Tourism, January 1979.

[22] The models are simultaneous equations systems consisting of a cost function and related derived factor-demand equations. The functional

TABLE 5

Simulations of impact of higher factor prices on Ontario manufacturing industries

	Energy costs	Labour costs	SIMULATION 1 % impact on				SIMULATION 2 % impact on			SIMULATION 3 % impact on			
Industry	Total costs (1975)	Total costs (1975)	Energy expenditure	Total costs	Quantity of capital	Quantity of labour	Energy expenditure	Total costs	Quantity of capital	Quantity of labour	Labour share of total costs	Total costs	Quantity of capital
01 Food & beverages	0.0097	0.124	20%	0%	0%	0%	43%	4%	3%	-1%	7%	1%	2%
02 Tobacco	0.0033	0.075	0	0	0	0	0	2	1	1	4	1	0
03 Rubber	0.0135	0.213	-12	0	0	1	-15	3	1	3	-2	2	1
05 Textiles	0.0138	0.243	9	0	0	0	12	3	2	1	1	3	6
10 Paper	0.0409	0.218	9	1	1	1	10	4	5	4	2	3	7
12 Primary metals	0.0396	0.230	3	1	0	0	6	4	1	4	1	3	4
15 Trans. equip.	0.0046	0.104	8	0	0	0	15	5	2	3	-2	2	2
17 Non-metallic minerals	0.0580	0.242	15	1	1	2	15	5	3	3	4	2	3
19 Chemicals	0.0386	0.155	-2	0	3	-1	-5	5	6	-3	8	1	4

NOTE: Simulation 1: increases in fuel oil and natural gas prices of 35%, electricity prices of 12%, coal prices of 8%. Simulation 2: increases in all energy prices of 50%. Simulation 3: increase in labour price of 10%.

the period oil products were substituted for coal) as well as a significant amount of substitution of capital and labour for total energy. The estimated own-price elasticities for energy (the percentage change in energy consumption with respect to a percentage change in energy price) were inelastic (averaging -0.6 for energy-intensive industries).

Several simulations were run with these models in an attempt to determine the impact on total costs of production of higher prices of inputs especially energy.

In Simulation 1 it was assumed that a $5 a barrel increase in the price of crude oil would be fully reflected in the price of residual fuel oil, increasing its present price of $14 by 35 per cent. The price of natural gas in this simulation was also increased, so that natural gas price levels at Toronto City Gate were 85 per cent of crude oil prices. Electricity prices were increased by 12 per cent and coal prices by 8 per cent (all on a heat content basis).

The results of Simulation 1 can be seen in column 1 of Table 5. These long-run equilibrium models ignore the real time constraints and the difficulties in adjusting quickly to such large price changes. Indeed, the immediate effects of sharp increases in prices of oil products and natural gas could be much different from the results given in Table 5. However, concentrating on the ultimate long-run response, in no case does the 35 per cent increase in the prices of residual fuel oil and natural gas increase total costs of production by more than 1 per cent. The reasons are as follows. First, in many industries fuel is not a significant portion of total costs. Second, the estimated models indicate that the higher levels of some energy prices induce firms to substitute less expensive energy products for the now relatively more expensive energy products. In the vast majority of cases, given the magnitude of the relative price changes, coal would apparently be substituted for oil and natural gas. This result is not verified by trends in industry energy consumption. In 1978 coal represented less than 1 per cent of the btu's used as fuel in the Ontario industrial sector, and Ontario is poor in coal resources except for significant lignite reserves in the James Bay area. Coal may therefore not

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form is the 'translog,' a second-order Taylor series expansion on logarithms. For a description of the use of the translog cost system see Denny, Fuss, and Waverman (see note 20) or E.A. Hudson and D.W. Jorgenson, 'U.S. energy policy and economic growth, 1975-2000,' Bell Journal (Autumn 1974).

be a realistic substitute for higher-priced oil and natural gas.[23] The third reason that total costs do not respond in proportion to the increase in energy costs is the substitution of capital or labour for energy. The quantities of capital and labour employed, as indicated in Table 5, do not increase markedly in response to higher energy prices. However since labour and capital inputs are much greater in size than energy inputs, small percentage changes in labour and capital use can substitute for large percentage changes in energy.

In order to isolate the effects of interfuel substitution from the effects of the substitution of capital or labour for energy, in Simulation 2 all energy prices were increased by 50 per cent with the prices of labour and capital remaining unchanged (and the price of materials increased by 3 per cent to reflect the price rise of the energy component). Total costs of production increased by 2 to 5 per cent as a result of a 50 per cent increase in all fuel costs, while total energy expenditure shows wide patterns of change, reflecting the substitution of labour or capital for energy. The greater impact on total production costs in Simulation 2 is due to the absence of interfuel substitution. If coal is not in fact a viable alternative to oil and natural gas, a 35 per cent increase in the price of hydrocarbons will likely increase total costs of production in the Ontario manufacturing sector by 2 to 4 per cent.[24]

In Simulation 3 energy prices were left unchanged and labour wage rates increased by 10 per cent. The increases in total costs of production range from 1 per cent (Tobacco, Chemicals) to 3 per cent (Textiles, Paper) as a result of the 10 per cent increase in the price of labour. Higher wage rates also induce substitution of capital for labour, as indicated in the last column of the table. For the Ontario manufacturing sector a 13 per cent increase in wage rates likely has a similar impact on the total costs or production as a 35 per cent increase in fuel oil and natural gas prices.

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[23] In addition, the models assumed that the supply of coal would not increase as the demand for coal increased. In reality the supply curve of coal may be upward-sloping, and the market prices of coal may escalate so as to prevent any massive substitution of coal for oil.

[24] Not included in the model is an equation determining the volume of output and the price charged. Since the effects of higher energy prices are to increase total costs, output price will increase, thus reducing demand for the product. This decrease in demand is deflationary. Note, however, that in most of the simulations reported, higher energy prices induce greater capital investment and in most cases greater employment as well; these effects mitigate the deflationary effects that directly result from higher energy prices.

In another simulation (not reported in this paper) the price of natural gas was kept to 75 per cent of the oil price at Toronto. This differential (75 per cent as against 85 per cent of oil prices) had little effect on the model results, slightly increasing the use of natural gas at the expense of fuel oi. However, given the current oversupply of residual oil in the Ontario market, maintaining the price of natural gas at 75 per cent of the crude oil price would likely only deter oil refiners from passing on increased crude oil costs in the price of residual. As a result, lowering the controlled relative price of natural gas to crude oil may not lower the market price of natural gas relative to residual oil.

In summary, substantial increases in oil and natural gas prices will have some impact on the competitiveness of the Ontario manufacturing sector, an impact however not out of proportion to the effects of increases in real wage rates of 4 to 5 per cent (13 per cent in nominal terms). While we should not minimize those impacts, they are not of the order to substantially harm Ontario manufacturing. In some industries, some firms will be specially hurt. To subsidize all consumers, residential and industrial, commercial and transport, rich and poor, to protect the few that need assistance is unwise charity. The total cost would be lower and it would be more efficient to subsidize directly those firms which will be seriously damaged in a transition to world oil price levels. An advocate of the market system would argue that it is unwise to subsidize any firm because of an increase in factor prices since it is difficult to determine a priori which firms are 'seriously' hurt and which are not. The 'invisible hand' will, of course, ultimately decide which firms are affected seriously enough to leave the market.

SUPPLY

For most commodities the 'law of supply' holds; higher prices, other things equal, bring forward increased production. Three issues complicate the law of supply for hydrocarbons: the large difference between the retail price of oil and the net to producers; the lengthy period between the time the decision is made to increase production and the time when that increased production actually comes on the market; and the depletable nature of these resources.

In 1978 Canadian oil producers, on average, received $5.64 a barrel of the $12.75 a barrel price (Ontario Energy Review, June 1979). Provincial governments received $5.12 a barrel, most of this in the form of gross royalties, determined as a percentage of the gross revenue per barrel. In Table 6 provincial oil revenues (excluding income taxes) are given for 1947-78. In 1978 royalties accounted for 77 per cent of the total, revenue from land sales accounting for a further 20 per cent. By the British North America Act of 1867, both federal and provincial governments can levy direct taxes, but only the federal government can levy indirect taxes. An indirect tax is defined as a tax paid by the consumer rather than the producer, i.e. a tax which determines the price. Indirect taxes are beyond the powers of a provincial government for they may determine the price of a product which is sold in interprovincial trade. Income taxes have been held to be direct taxes, i.e. taxes which are not price-determining but price-determined. The direct tax cannot affect the price in the market; it is a levy on producers who are resident in the province.

The power to enact royalties, the rights to revenues from minerals, had been given to the original founding provinces in 1867 and to the Prairie provinces in 1930.[25] Royalties levied by a province as landowner are not regarded as indirect taxes.[26] In Manitoba, where freehold mineral and oil rights prevail, the taxation of petroleum and minerals is via a 'net income' tax rather than a gross royalty.[27] In Alberta, where the province owns most of the mineral rights itself (some 80 per cent), these rights not having been alienated to freehold land purchasers during settlement, a gross royalty system is used and does not appear a priori to be ultra vires the power of the provincial Legislature.[28] The Supreme Court held in November 1977 that the 1974 Saskatchewan government tax schedules for oil

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[25] See F. LaForest, Natural Resources and Public Propery Under the Canadian Constitution (Toronto 1969).

[26] In the Caledonian Collieries case (The King v. Caledonia/ Collieries Limited [1928] A.C. 358) a tax on the gross revenues of a mine was held to be an indirect tax.

[27] In Manitoba approximately 75 per cent of the mineral rights in the southwestern part of the province, where oil and gas are found, are privately owned.

[28] D.E. Lewis and A.R. Thomson, 'Canadian Oil and Gas,' Butterworth's Law Digest 1, 4.28.

Table 6

Provincial Oil Revenues, 1947-78 (in thousands of dollars)

	Alberta			Total (Alta., Sask., B.C., Man.)		
	Land sales	Rentals	Royalties	Land sales	Rentals	Royalties
1978	608,884	66,972	2,717,651	89,531	89,531	2,991,854
1977	579,743	61,744	2,133,661	715,540	81,210	2,385,576
1976	160,154	55,653	1,762,710	212,486	73,260	1,992,600
1975	105,991	100,654	1,352,768	118,740	116,464	1,597,068
1974	58,252	76,287	964,083	85,176	92,229	1,171,643
1973	43,586	80,563	392,636	66,537	93,019	437,057
1972	25,727	75,195	196,284	50,914	87,969	226,972
1971	23,922	68,844	167,721	48,614	82,112	197,428
1970	25,688	56,111	136,417	45,858	69,214	164,439
1969	102,180	61,224	113,219	128,690	76,975	140,974
1968	93,391	55,235	101,321	113,672	70,114	127,802
1967	87,721	53,507	92,714	111,440	76,926	118,399
1966	99,120	53,220	75,266	122,156	67,024	99,728
1965	119,662	57,408	67,971	149,227	69,002	87,994
1964	84,820	42,771	60,854	106,328	54,186	80,886
1963	46,647	37,792	55,139	59,085	48,042	72,446
1962	33,154	38,476	47,990	48,283	42,157	61,521
1961	44,631	30,861	35,431	53,685	41,580	45,318
1947-60	564,382	263,868	245,887	634,633	340,988	278,161
Total	2,908,655	1,336,385	10,719,723	3,681,028	1,671,102	12,277,886

SOURCE: Oilweek 12 Feb. 1979

revenues were indirect taxation and ultra vires the Legislature of Saskatchewan.[29] That 1974 scheme attempted to tax 100 per cent of the differential between the basic wellhead price and the Canadian price of oil. In terms of 'pure' theoretical economics, a gross royalty is an indirect tax because it is a form of excise tax. Excise taxes are shared between consumers and producers depending on the relative elasticities of demand and supply. Since Canadian oil production is small relative to world oil production, it has been argued that provincial gross royalties cannot affect the Canadian market price for oil since that price is determined in the world oil market. In so far as Canadian domestic oil prices are not at world levels, the gross royalty does partially determine the price of oil in Canada.

Disregarding legal questions, it is clear that the present debates in Canada over the price of oil are over who ought to receive the excise tax and in what form. The difference between the world price and the controlled wellhead price in Canada is a negative excise tax to consumers; we have seen who benefits from that subsidy. The Alberta gross royalties benefit Alberta residents. Discussions of the price increase for 1980 are now explicit discussions of excise taxes not prices. The government of Ontario has released a document stating that a $5 per barrel increase in the price of oil would lead to increased revenues of $4.77 billion, $2.2 billion accruing to the producing provinces and $1.83 billion to the producers.[30] Given present royalty schemes, almost 50 per cent of any increase in the Canadian oil price is directly received by provincial governments, mainly Alberta. Therefore, existing royalty schemes act as interprovincial excise taxes, consumers in Ontario and Quebec being taxed per barrel for the benefit of residents of Alberta. In order to achieve self-sufficiency at minimum dislocations to the economy, the Ontario government believes that $2.81 billion of this $4.77 billion should be placed in a National Energy and Employment Adjustment Fund rather than allocated to investments through producing provinces or through a functioning market system. Most bureaucractic actors seem to have accepted the argument that the oil and natural gas industry does not need additional cash flow, that additional revenues to oil firms would not encourage exploration but would instead likely flow out of the country. If these views are accepted, Canada, within one year, could have a wellhead price of $18.75 per barrel, with $8 to $10 a barrel on average flowing to petroleum companies.

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[29] Canadian Industrial Gas and Oil Ltd. Government of Saskatchewan et al and the Attorney General of Canada et al, Supreme Court of Canada (1977). This decision is discussed in A. Paus-Jenssen, 'Resource taxation and the Supreme Court of Canada: The Cigol case,' Canadian Public Policy (Winter 1979).

[30] The Honourable W.G. Davis, Oil Pricing and Security: A Policy Framework for Canada (August 1979).

This situation would in my judgment be a serious error for Canada as a nation to accept. This differential between the wellhead price and the net to producers ignores the economic distinction between marginal and profitable fields and will, I suggest, have serious negative ramifications on Canadian energy self-sufficiency in the long run.

Royalties are after all designed to extract some portion of the economic rent of some oil fields. Not all barrels of oil produce the same or even any economic rent. A basic ad valorem gross royalty cannot distinguish between a marginal barrel costing $18.75 to produce and an intramarginal barrel costing $1.75 or less to produce. The provinces do not rely on basic ad valorem royalties, recognizing the disincentive effects of simple gross taxes. The Manitoba Royalty and Tax Act (1 January 1975) utilizes a version of a net royalty tax. Both the British Columbia and Alberta royalty schedules distinguish 'old' and 'new' production and contain incentives for reinvestment of net revenues in further exploration and development. However, the connection between rent collection and development incentives is crude at best once it assumes that the degree of reinvestment is equal to the percentage of income which is rent. Gross royalties, no matter their sophistication, as excise taxes drive a wedge between the 'natural' price and the net price to producers and therefore discourage the production, discovery, and connection of new reserves.[31] If we continue in this direction, we shall find all the oil in Canada which costs $10 to produce rather than the oil which should be found at the gross price to consumers of $18.75.

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[31] As J. Helliwell in his paper states the case: 'When world oil prices shot up in 1973-4, and there was a scramble for the current and potential windfall gains on low-cost natural gas deposits, it became apparent to many producers that it was more profitable to keep reserves in the ground than to invest in facilities that would permit faster production.'

All project developers, of course, have an incentive to argue that their projects are special, i.e. high-cost and properly exempt from royalties. Syncrude, for example, receives a 33¢ per barrel levy from each barrel of oil sold in Canada so that its product can be sold at world price levels. In my view it is inefficient and open to manipulation to allow individually negotiated special exemptions from taxation for certain projects. We presently allow synthetic oils to be sold at world price levels but deny this incentive to cheaper conventional crudes. As a result we allocate resources to developing synthetic fuels instead of fully developing our conventional deposits through further exploration and further development of known fields.

In our energy and constitutional warfare we have subverted the market system to the point where price is no longer a signal to producers or consumers. Price increases for oil are not viewed as the marginal wedge to allocate resources but as the slice of revenue to squabble over.

It is therefore time to re-examine and reform the role of price and the present rent collection devices in order to prevent serious long-run distortions from appearing in the oil market. Price should become the signal to both consumers and producers of the marginal costs of production. Under existing and contemplated royalty schemes, attempts to collect rent via two kinds of excise taxes, gross royalties and domestic price ceilings, will create economic losses.

The best form of rent collection device is the income tax; no income, no rent, no tax. With a wellhead price of $18.75 and the complete absence of a gross royalty scheme, the marginal barrel costing $18.75 would be discovered. The income tax could be 50 per cent or even 75 per cent of net profits, but if the income tax affects only intramarginal rent, not marginal costs, then it will not distort producers' incentives.[32] A net royalty is akin to a profit tax; it is levied on gross revenue less an allowance for production costs. Net royalty schemes are not unknown. The Ontario Mining Tax, for example, levies a tax on mine revenue less working expenses, depreciation on plant and equipment, exploration and development costs, and notional costs for processing.[33] There are a number of advantages to the use of a net royalty tax generally, instead of the gross royalty in use at present, and some disadvantages.

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[32] A profit tax is a tax on the return to a specific factor (capital) as well as a tax on economic rent. A good deal of literature has been devoted to the study of the disincentive effects of net income taxes (see P.A. Musgrave, Theory of Public Finance (McGraw-Hill, 1959). chap. 16; J.A. Pechman, Federal Tax Policy (Brookings, 1966) chap. 5), but such discentive effects are small compared to those of a gross royalty.

The net royalty will not distort producers' incentives to find oil at the wellhead price if the allowable costs deducted from revenue are close to the actual economic costs incurred. Marginal pools will be discovered and developed where the net royalty flow to the governments from those marginal pools is zero. The total revenue from the net royalty tax to governments will of course not be zero. In 1978 total royalty taxes paid by oil and gas producers amounted to $2,991,854, or 30 per cent of total industry revenues of $10,051 million. According to Oilweek, total net revenues (gross revenues less expenditures excluding royalties) was $4871 million. A net royalty of 61 per cent based on net revenues as defined crudely above would induce more exploration at the margin than the present gross royalty system and yield the same revenues to the provinces. The net royalty or net profits tax is also on more secure constitutional ground than the gross royalty.

In 1976 (the latest year for which corporation taxation statistics are available) the net book profit after taxes (including royalties as a portion of net profit) for the Canadian oil and gas industry was $4583 million. Net taxable income was $2574.7 million. Total royalties in 1976 amounted to $2103 million, these royalties representing 45 per cent of net book profit after taxes and 82 per cent of net taxable income. A 45 per cent to 65 per cent royalty would have yielded the same provincial revenues as were actually earned in 1976.

It has been argued that the effects of both net and gross royalties are similar in the end since both simply reduce the bonus bid that a firm will make for mineral rights. This is not in fact true. Assume the existence of an oil deposit whose exploration, development, and production costs are thought to be $11 a barrel. If the marginal gross royalty is $8 a barrel and the wellhead price is $18 a barrel, this deposit will not be developed. If the province enacts a 60 per cent net royalty scheme instead of the gross royalty, this oil deposit will be developed since producers will net $2.80 (40 per cent of $7.00) a barrel after paying all costs. The province is better off under the net royalty system because it receives $4.20 (60 per cent of $7.00) a barrel from production of an oil deposit which would not be developed under a gross royalty scheme.[34]

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[33] For a good description of the Ontario Mining Tax see J. Clark Leith 'What is Ontario's mineral resource policy?' Canadian Public Policy, (Summer 1978).

Setting the price of Canadian oil at world price levels is important as an inducement to supply additions. This inducement does not come through the effects of higher prices on industry cash flow; investment funds can be raised by petroleum companies from external capital markets. The importance of price in the market system is its impact on decisions at the margin. Excise taxes have perverse effects at the margin; net royalties do not.

Many problems are involved in using only net income taxes to exact rent from the oil and gas industry. First, the present royalty system is simple, relatively cheat-proof, and inexpensive for a province such as Alberta to operate. If Alberta, for example, were to move to a net royalty tax, extensive records of the producing companies would have to be analysed. The refining and marketing expenses as well as the exploration and development expenses of large integrated oil companies with head offices in other provinces would have to be calculated. The profit from production as separate from the profit of refining or marketing would have to be determined. Room for manipulation of records exists. The accounting procedures of the oil and gas industry, including the evaluation of intangible assets would have to be standardized.

But these problems could be overcome. The ideal would be a net income tax where the actual economic costs are deducted from gross revenue in determining the tax base. In reality it is likely impossible to implement an ideal net income tax because of the types of problems discussed in the above paragraphs. However, a properly conceived 'net royalty tax' using notional expenses might be the best feasible tax. The Manitoba Royalty and Tax Act, the Ontario Mining Tax Act, and royalty schemes in countries such as Bolivia use notional expenses in estimating net revenue.[35] I suggest that we seriously examine the feasibility of moving to a net royalty tax for the capturing of the economic rent from oil and natural gas production.

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[34] This argument is somewhat simplistic. The hypothetical oil field described would be developed under a gross royalty scheme if the wellhead price increased so as to make production profitable. The theoretical literautre on natural resource extraction suggests that a gross royalty generally forces firms to postpone production to the future, but ultimately all the oil will be produced since the price must rise to reflect the depletion of the reserves. However, where the price is independent of production, as with a small producer such as Canada, domestic gross royalties can affect the amount of oil ultimately produced.

Increasing the domestic price of oil to world price levels has important benefits on both the demand and supply sides. The speed with which we move to these new equilibrium prices is also important.

Producers of depletable deposits compare the time profile of expected future prices with the time profile of expected interest rates to determine whether it is more profitable to produce the inherently fixed stock of oil today or tomorrow.[36] For example, if the owner of an oil pool in Alberta were to decide that future oil prices would increase at a rate greater than the expected interest rate (the alternative rate of return which could be earned), it is clear that no production would take place today. If the oil is sold today and the receipts deposited in a bank, the net worth of the oil producer increases at the interest rate. Were the oil producer to refrain from production today and instead produce tomorrow, he would in effect be banking his oil deposits in the ground. Selling these resources tomorrow when the price of oil increases at a rate greater than the rate of interest is preferable to banking the receipts of today's sale.

Producers then have incentives to refrain from announcing discoveries or to refrain from searching today in areas with high probabilities of success if the expected price increase for oil is greater than the interest rate. Since 1974 Canadian oil price policies have sought to gradually adjust the domestic price of crude to a target - the world oil price - which has now become a quickly moving one. The Canadian domestically controlled oil price is currently $13.75; the prime interest rate is 12 per cent. A policy of increasing the domestic price of oil, at, say, $2 a year for the next three or four years guarantees producers a rate of return for oil deposits in excess of the rate of interest earned on deposits in the bank. In this scenario no large additions to oil reserves would be found. In fact for the last several years additions to proven oil reserves have fallen behind production.[37] While the lags in supply additions are considerable, these facts are consistent with the hypothesis that producers are acting to maximize the present worth of their oil reserves by maintaining the oil in the ground. Moving quickly to world oil price levels would today bring forth the additional reserves that would not otherwise be found until present oil pricing policies eventually forced the domestic price to world price levels. There are also good reasons on the demand side to move the price quickly to world levels rather than continuing to smooth out the transition. Raising domestic oil prices by $2 per year will ensure falling real prices to consumers, causing surges in demand as we have seen. If we wish to have correct incentives facing both consumers and producers, an immediate move to world oil price levels is necessary.

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[35] See M. Bucovetsky, M. Gillis, L.T. Wells, 'Comparative mining taxes,' and M. Gillis, 'Structure of Bolivian mining taxes,' in M. Gillis et al., Taxation and Mining: Non-Fuel Minerals in Bolivia and Other Countries (Ballinger, 1978).

[36] For a good heuristic description of the operations of resource markets see R.M. Solow, 'The economics of resources or the resources of economics,' American Economic Review (May 1974).

SUMMARY

I have argued that the present Canadian oil and natural gas pricing policies should be dropped in favour of a policy which moved the price to near world levels within two years. This quick adjustment is needed for supply and demand conditions. On the supply side, maintaining a rate of increase in domestic oil prices at or below interest rates (10 or 12 per cent) would deter discovery in the near term. Consumers should no longer be sheltered from reality; oil is worth $26.00 a barrel not $13.75. To continue to subsidize oil consumption delays the implementation of the necessary conservation practices. Examining American and Canadian car purchases in 1979 in conjunction with gasoline prices changes in the two countries is convincing evidence of the inefficiencies engendered in Canada by these oil price subsidies.

Two specific issues that trouble consuming provinces have been examined in detail: the income redistribution effects of the oil price subsidy and the impact of energy prices on the costs of production in the Ontario manufacturing sector. In 1974 the average urban Ontario household spent $1950 on energy directly and indirectly (through the energy component of other purchased goods and services). The ceiling on the prices of oil and natural gas saved the average urban Ontario household $480 in 1974. The conclusion is inescapable that oil price subsidies benefit consumers (at least in the short run) but, in comparing energy expenditures to total expenditures, that the rich likely benefit proportionately more and much more in absolute terms. In 1974 Canadian families of under $4000 in income saved $150 each due to price controls on oil and natural gas while families with incomes over $15,000 saved $650 An oil price subsidy is therefore a poor device to redistribute income between rich and poor families, and its effects may be perverse. The oil subsidy did benefit residents of the Maritimes proportionately more and residents of Ontario proportionately less. Additional data is needed to examine whether the poor in poor regions of the country benefited proportionately more from the subsidy than the comparatively well-off in wealthy regions.

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[37] See American Gas Association Inc., American Petroleum Institute, and Canadian Petroleum Association, Reserves of Crude Oil, Natural Gas Liquids and Natural Gas in the United States and Canada as at December 31, 1978.

Turning to industry, substantially increasing oil and natural gas prices (35 per cent) will increase the total costs of manufacturing in Ontario by 2 to 5 per cent. Large increases in oil and natural gas prices have a small impact on total costs for three reasons. First, fuel costs are a small proportion of the costs of doing business for most industries. Second, there is some indication that less expensive energy (coal) could be substituted for more expensive energy. Third, higher energy prices induce substitutions of labour or capital for fuels. The increase in total costs due to oil and natural gas price increases is not negligible however; it is equal to a 13 per cent increase in wage rates. The substantial gap at present between the Canadian oil price and the world oil price ensures substantial costs when the gap is closed. Poor consumers can be sheltered from these costs by a refundable tax credit. In my view the merits of sheltering firms is less clear. Where it can be shown that world price levels for fluid hydrocarbons will cause a firm to close down and create unemployment for a substantial work force with few opportunites for re-employment, then a transitional subsidy is in order.

Increasing the wellhead price of oil via increases in excise taxes has serious dislocative effects. An excise tax or a gross royalty is an inefficient tax collection device which drives a wedge between the market price and the net to producers. Present policies may lead to a situation in 1980 where the producers' net is $8 to $10 out of a wellhead price of $18.75. We shall then find all the oil in Canada costing $10 to produce. The correct supply response would be to find that barrel of oil costing $18.75 to produce. The present gross royalty systems, even with their built-in incentives for exploration and development, diminish incentives for producers to find and develop oil and natural gas deposits. The special incentives for synthetic oils discriminate against lower-cost conventional resources. I recommend that the present gross royalty system be scrapped in favour of a net royalty system. An ideal net royalty system which determines the tax base by deducting true economic costs is not practical. A net royalty tax based on notional expenses could be developed and would, at the margin, provide significantly more incentives to producers than the present gross royalty schemes.

One cannot discuss the prices of oil and natural gas without mentioning the regional disparities in the relative impacts of a sharp adjustment to world oil price levels. Increasing the present oil price to $24 a barrel (with natural gas prices at 85 per cent of oil prices calculated at the Toronto City Gate) would increase revenues from oil and gas production by $9.4 billion. Under existing royalty and income tax schedules, $4.4 billion of this increased revenue would flow to the producing provinces with, $1.9 billion going to the federal government. Yet the significant adjustment costs are not borne by the producing provinces. Given the present oil and natural gas consumption patterns, the energy bill for Ontario would increase by $3.4 billion were fluid hydrocarbon prices to increase to the levels I have suggested. If we are to retain a viable federation and economic order, it is essential that some portion of this $4.4 billion excise tax revenue accruing to the producing provinces be used to cushion the impact of these price increases. Transitory subsidies should be given to the poor families and firms with special circumstances in order to ameliorate, across Canada, the effects of these large proposed price changes. These subsidies should be paid by the producing provinces. If the producing provinces do not agree to these subsidies, an increase in the prices of fluid hydrocarbons cannot be viewed as necessarily good for Canada as a whole.

While economists generally view with favour the role of price and the operations of the marketplace, we do not accept all price mechanisms as equally valuable. Under present administrative mechanisms, increasing the prices of oil and natural gas are operations of the tax system not the market system. These administrative mechanisms are not the best that could be devised. We are facing at this moment in Canada the real issue of whether economic rents from fluid hydrocarbon production will continue to be inefficiently distributed among all Canadians via domestic price ceilings on oil and natural gas and misallocative gross royalty system. There are other ways of distributing these rents to all Canadians that can ensure conservation and the optimal exploitation of our natural resources. These are to use the marketplace, the price system, revised net profits and net royalty systems, and the invisible hand of competition. To move to these alternatives we must come to some mutually acceptable decision to share resource rents among all Canadians. That decision is the hardest to reach.

APPENDIX: AGGREGATION OF FINAL DEMAND COMMODITIES

	Categories used in urban family expenditure	commodities in input/output table ('L' aggregation)	
1	Food plus tobacco and alcoholic beverages	20001	Food & non-alcoholic beverages
		20002	Alcoholic beverages
		20003	Tobacco
		20037	Exp. in restaur. & hotels etc.
2	Clothing	20004	Men's & boy's clothing
		20005	Women's & children's clothing
		20006	Footwear & shoe repair
		20034	Jewellery, watches, & repairs
3	Owned shelter	20007	Gross imputed rents
4	Rented shelter	20008	Gross paid rents
5	Other shelter	20009	Other lodging
6	Fuel, light, & water	20010	Electricity
		20011	Gas
		20012	Other fuels
7	Furnishings & Equipment	20013	Furniture, carpets, & floor cover.
		20014	Durable household appliances
		20015	Semi-durable household furn. & supplies
8	Household operation	20016	Non-durable household supplies
		20017	Laundry & dry cleaning services
		20018	Domestic services
		20019	Other household services
		20029	Communications

9	Medical care	20020	Medical care
		20021	Hospital care
		20022	Other medical care
		20023	Drugs and sundries
10	Car purchase & operation	20024	New & used automobiles
		20025	Auto repairs & parts
		20026	Gasoline, oil & grease
		20029	Communications
11	Other transporation	20028	Purchased transportation
12	Recreation	20030	Rec., sports & camping equip.
		20032	Recreational services
13	Personal care	20035	Toilet articles, cosmet. etc.
		20036	Personal care
14	Reading and education	20031	Books, magazines, & stationery
		20033	Education & cultural services
15	Other	20038	Personal business
		20039	Oper. exp. non-profit orgn.
		20040	Net expenditures abroad

E. C. Sievwright

In the oil price issue there seem to be two clear positions, the doves and the hawks; in between are the chickens, and I suppose I shall call myself a chickenhawk.

One of the aspects of Leonard Waverman's paper that I enjoyed was the reference to Adam Smith. It took us all back to Economics 100 and made me think about supply and demand in traditional classical terms. The normal working of supply and demand price relationships imply the homogeneous product. In other words, when demand produces inventory, another unit of the same product will be produced using the same combination of factors of production. This is pretty straightforward. This usually gives the least-cost combination of factors, and this is the way that Adam Smith wanted to optimize the system.

In the case of oil being produced in western Canada in the sedimentary basin today, this position would imply additional production from similar wells using the same factors of production, in other words, that Devonian oil was replaced by more Devonian oil and on indefinitely. This is not the case, and I think that as the eighties pass it's going to become less and less the case.

The trend is for production from conventional sedimentary sources to decline sharply and be replaced by synthetic oil, frontier oil, and also tertiary recovery. Now these production modes all use different factors of production; they are more capital-intensive; and they are completely different from conventional methods.

Let's look at the NEB's projection of trends in the various types of oil production. Established reserves, that is, the oil we know is in the ground, currently provide 87.5 per cent of Canadian production; by 1985 it will have declined to 55 per cent and by 1995, 16.7 per cent. In other words, the resources in the ground of the Adam Smith type are declining from a predominant 87 per cent to 17 per cent. Where will the rest come from? From oil sands. Currently oil sands account for between 4 and 5 per cent of total production; by 1985 it will be up to 19.8 per cent; and by 1995, 54 per cent of Canadian oil production will come from them. I suggest that this rapidly changing mix of supplies is of crucial importance. As production of oil in Canada declines at an average annual rate of 5.6 per cent over the next ten or fifteen years, demand is conservatively estimated by the NEB to increase by 1.7 per cent. This year to date demand is increasing at nearly 4 per cent, more than twice the NEB's predicted level.

What does this mean now? It means that effectively we are replacing one kind of oil with another kind, conventional sedimentary oil with synthetic oil, and they are based on completely different factors of production. To the extent that new domestic supplies cannot keep up with demand, as has been indicated, imports will have to be increased. Canada is therefore part of the world's oil economy whether we want it or not.

Unfortunately there is a trend in the world to higher-cost oils, not only in Canada. Low-cost oil, about $2000 a barrel a day, comes from prolific sources such as the Middle East and Mexico. Medium-cost oil, about $8000 a barrel a day, comes from sources like the North Sea, deeper Iranian production, and new US fields. Many of these also give high-cost oil, which runs between $20,000 and $33,000 a barrel a day. Unfortunately the new sources we are looking at in Canada fall almost entirely in the high-cost category.

So the role of price has changed from the textbook case so eloquently stated by Smith. The natural price, according to his concept, needed to ensure continued supply, that is, to encourage the entrepreneur to invest in frontier projects. This price does not relate to the barrel of oil just produced but to the cost of the replacement barrel based upon the different combinations of factors of production.

The recognition of this fact through the adoption of world prices would ensure continuity of future supply from high-cost non-conventional sources. There was a brief reference in the paper to conservation, and although conservation is not really a part of price I think price is a part of conservation. The cheapest barrel of oil is the one you don't use. I suggest that when effects of price increases are considered conservation should always be regarded as a real and essential option.

P. Stauft

It is indeed a pleasure to comment on Dr Waverman's very interesting and perceptive paper on the pricing of Canadian oil resources. Since my background is in the resource industry, I will confine my remarks to areas of some familiarity, particularly on the supply side of the discussion. My appreciation of the paper is predicated on the theory that he must be right for the most part because I can understand it and agree with him. There is, however, one unacceptable accusation in the dissertation, as well as some items that I hope I can amplify in a constructive way.

I found Dr Waverman's comments on price relative to demand very interesting, particularly the statement that the maintenance of artificially low prices is not an effective form of income redistribution. I think this is true, and I believe some of the side effects are serious problems. Low prices have essentially created many inefficiencies in industry. Capital has not been invested quickly enough to become more efficient, and we have been profligate in the use of depleting resource. I can only agree wholeheartedly that oil should be priced in line with world prices. Canada has been living in an unreal shelter, and I believe that has left us in a vulnerable position.

The rate of change to world level prices is another story. I believe we should phase into higher prices, not move precipitately. It's like learning to swim by getting pushed off the raft: there can be adverse consequences. In summary I think Dr Waverman has brought forward some important data and logic on price and demand.

Turning to the supply side, I agree that it would be a serious error to accept blindly a notion that the producer already has enough netback share and needs no more. If the opportunities for supply can be developed, then I believe industry should retain the financial ability to develop them. It would be considerably less than realistic of me to say that the explorer-producer needs a major share of incremental prices. What he does need is a fair share to invest in opportunities using his expertise, fair profits and/or dividends, and in general a positive environment for planning. Reinvestment is the key to deciding what the logical share should be.

Dr Waverman's thesis that net royalties will bring on marginal supply is essentially correct, but there are some practical aspects of today's system that I would like to comment on. Provincial rent collection is a very complicated business, particularly when combined with incentives. The system has grown to reflect the need to encourage supply development. In a competitive exploration environment the pace of exploration and the development of high cost oil such as tar sands and tertiary oil deposits depends in part on the perception of the investor. Reward alone, subject to the whims of a future government move, may not be enough for a risk-taker. I do not believe net royalties by themselves are the answer. As an optimistic explorationist, I can safely say that even in a mature exploration area you are not looking for marginal production; unfortunately, that may be what you find. The western provinces have essentially put in a form of net royalty versus gross royalty in that marginal wells attract practically no royalty. The incentives on drilling and seismic investments may be a crude connection with rent collection, but it works and has a place in promoting supply development.

When the federal government and the provincial government squabbled over revenue after the price increases in 1973 and squeezed the producers down to an unacceptable return, activity slowed markedly. It came back when the incentive system was introduced to provide the returns to help make the gamble worthwhile. In summary, the present royalty tax system may not be theoretically perfect, but I think it is fair to say that a competitive industry has adapted and pushed ahead with the development of energy. In today's world and in a complex industry I am not sure that sweeping simplistic royalty tax changes would maintain the momentum of a vital industry in a critical time.

The accusation I referred to earlier is Dr Waverman's notion that if the owner of an oil pool in Alberta decided that future oil prices would increase at a rate greater than the expected interest rate, then no production would take place today. This statement suggests that the industry is a massive conspiracy. Rapidly increasing prices are a pretty logical forecast, and yet oil is being produced today.

Explorers do not work just on bank interest: they are looking for that better-than-bank-interest return as a reward for the risk. That's the name of the game. Producers legally, let alone logically, cannot refrain from announcing discoveries, specifically to the government. In practice no explorer would competitively pre-invest millions of dollars in high-graded acreage and then sit on it. That just is not the nature of the industry, because it is progressive and competitive. The pure theory may have some credibility, but the practice does not follow it. My view does not support a rapid one-year movement to world price. I believe that the cost-benefit analysis of the rate of increase to world level has to be examined in the context of what we have today and what is in the national interest.

In conclusion, I wish to thank Dr Waverman for providing a thought-provoking analysis of a major issue in our time. Although I have picked away at the edges of the Adam Smith analogy, the basic logis is there. I hope that continuing dialogue in forums such as this will provide policy-makers with the basis for developing better ways to cope with the present and plan a better future.

C. Watkins

I am in broad agreement with the tenor of Leonard Waverman's paper. Most of my comments will relate to the section of his paper dealing with supply, but I want to begin with a few comments on the demand section.

First I want to draw your attention to the calculations undertaken by Dr Waverman on the effect of higher energy prices on consumer income, distinguishing between direct and indirect effects. It is the only analysis of this matter I have seen done in this form, and I commend you.

Second, a point Dr Waverman touches on is that a policy of gradual increases in prices can erode some of their impact. This is because gradual price increases tend to be submerged in general inflation and therefore are less visible. In this way sharp changes in circumstances in the world oil market are not properly reflected in the behaviour of the domestic market. Thus there can be a difference in response to the same level of price increase according to whether it is a gradual increase over several years or a sharp schock one year.

A final point on demand: I was was surprised with Dr. Waverman's statement that coal may not be a realistic substitute for higher-priced oil and gas. My impression is that there is a real possibility of a revival in coal markets, for example in cement or lime manufacture, and I do not see why the fact that Ontario is poor in coal resources rules that out if coal were competitively supplied. After all, there are substantial coal reserves in Saskatchewan and Alberta!

I would like to move now to supply.

First, I think Dr Waverman over-simplifies the question of royalties in Alberta. There is implicit recognition in the regulations of the way in which an insensitive gross royalty can curtail supply. Let me mention two aspects:

- the distinction between old and new oil (new oil is that produced from enhanced recovery schemes, pool extensions, and new discoveries after 1 April 1974): the royalty rate on old oil is 44 per cent and on new oil 28 per cent;
- the sensitivity of royalties to production rates: royalties are reduced on low production levels, hence tending to avoid premature well abandonment.

Second, royalties are levies that derive from Alberta's role as a resource owner; I believe such royalties have to be levied on production. This to some extent makes it more difficult to move to the kind of net royalty system suggested by Dr Waverman. An interesting sidelight on this issue, and one not mentioned in the paper, is the new coal royalty schedule developed by the Alberta government, where royalties continue to be expressed on a gross basis yet in effect are computed in a way tantamount to a profits tax. In other words, in the case of Alberta coal, profit taxes masquerade as royalties.

Third, and my main point, I am not at all convinced that a full net royalty system is an appropriate answer to the problem raised in the paper. In the case of petroleum a net royalty system is potentially very awkward and administratively burdensome. I think this is acknowledged in the paper, but I want to place more emphasis on it. A net royalty system could embroil us in the complex problems of cost allocation that the Federal Power Commission in the United States tried to grapple with in the 1950s during attempts to establish price controls for United States gas based on costs. I will not dwell on those problems because they are well known. I suggest that sort of administrative nightmare can still arise with the kind of net royalty system envisaged in this paper.

With coal one is dealing with a limited and manageable number of entities - individual coal mines - and it is therefore easier to apply a net royalty or disguised net royalty calculation. In the case of the myriad of oil and gas reservoirs and the portions of them under different ownership, applying a net royalty system would be a difficult task, and no doubt some quite arbitrary rules would have to be developed to handle the complexity. Even so the sort of mixed gross/quasi-net system we have at present, imperfect though it is, may at least be workable as a net royalty system.

Remember that we do allow in the royalty system for reductions in new sources of supply and for reduced 'terminal' royalties. This at least helps ameliorate the marginal-cost/gross-royalty problem discussed by Dr Waverman. Also, we do have a land bidding system which will pick up some of the economic rent that might otherwise escape the royalty system. Moreover, in the case of an oil sands plant such as Syncrude, the royalties are imposed in a flexible way and tend to act as a quasi profits tax.

I think that in parts of the supply section the argument made by Dr Waverman is overstated. For instance, he says producers can 'have incentives to refrain from announcing discoveries or to refrain from searching today in areas with high probabilities of success if the expected price increase for oil were greater than the interest rate.' There is a countervailing aspect, which is the way the land tenure system, requirimg exploration within a certain period, constrains the ability of companies to defer exploration. Dr Waverman goes on to say that 'for the last several years additions to proven oil reserves have fallen behind production,' a consequence, he suggests, of expected price increases deferring activity. More important here, I think, has been the switch in incentives from oil-to gas-directed exploration as a result of price differentials: gas producers enjoy world prices on substantial volumes of gas exports. He implies that producers may have an option to maximize the present worth of their oil reserves by maintaining oil in the ground. In fact it is the federal government that has restrained production by limitations on the export market, only partly offset by movements of oil to eastern markets. Also, the Alberta proration system removes output decisions, by and large, from the hands of producers. In other words, producers' output options are curtailed by institutional elements.

I would also like to make a point, a rather perverse one perhaps, in favour of a gross royalty system on efficiency grounds, given a land tenure system and output quotas (prorationing) that militate against restraints on current production. In technical economic terms my concern is with inclusion in the cost of current production of the discounted profit that would be obtained on deferred production - what in economic jargon is called user cost. Under the land tenure system and given prorationing, the restraint that user cost could induce on current production tends to be obscured. Thus one can argue that the gross royalty system could act as a compensating factor by increasing marginal costs and thereby curtailing current output. I am not implying that there is any reason why it would be a precise surrogate for user costs; any impact would simply be directional.

Finally, I wish to emphasize the point made by Dr Waverman on what I would call the Syncrude-type distortion, where world prices are awarded to one particular source of new oil - synthetic oil from oil sands plants. Thus there is a potential inefficiency in our ordering of the exploitation of new sources of oil supply. In other words, we are not investigating the price response to world oil prices from new sources of conventional oil, including enhanced recovery from existing oil reservoirs and new conventional reservoirs. We should not discriminate in this way between new sources of supply.

Discussion

QUESTION: The statistics of the industry show that even though we've gone through these traumatic price increases from about $3.00 a barrel to $13.75 the actual year-end reserves of crude oil have gone down continuously year by year for the last nine or ten years. So currently the supply of oil is not price-elastic, which it seems to me is one of the foundations of your paper. Similarly, the price of petroleum products has gone up, and yet the demand for them in Canada has gone up too, so I suggest that the demand is not price-elastic, at least to the degree that you suggest. I agree that the poor will find it more difficult to pay these higher prices, but I don't think that's going to have much influence on the total demand for petroleum products in Canada, assuming the supply is there. It seems to me the basic foundation of your thinking is incorrect, because you're dealing with a non-renewable resource so that if you increase the price you are not necessarily going to increase the supply. We need a much deeper analysis of the energy supply-demand situation in Canada.

Secondly, you say that the OPEC cartel price is a natural price by Adam Smith's definition. But Adam Smith's definition doesn't begin to cover a situation where a price of $23.00 is appropriate for a product that costs pennies to develop and produce in those prolific middle east fields.

I note your use of the world 'subsidy.' A subsidy, according to the dictionary, is a pecuniary amount paid by a government to an individual or a commerical organization. I don't think there have been payments to any Canadians as individuals or commercial organizations. The Canadian government has paid to try to keep the price of crude oil equal across Canada, but that is not the kind of subsidy you are talking about. I don't think the individual consumer has been subsidized, and yet your paper continually refers to consumer subsidies resulting from the difference between the OPEC price and the natural price of oil in Canada for Canada's entire consumption. I don't think that's logical.

I'll ask two or three more questions. First, what would you recommend if the OPEC price, which is now about $23.00, rose to $50.00? Secondly, why do you not deal with the windfall profits that your recommendation would create; in particular, why do you not discuss foreign ownership and the problem of the revenues that go to the multinationals, which as we have seen have not been reinvested in oil to the degree that they have been in coal, uranium, metal mining, and other such things?

LEONARD WAVERMAN: Let me start with your first point that price has gone up but supply has not. If I asked most engineers whether they would find more oil or more anything if the price was $15 rather than $3 I think they would say yes. It's clear that tar sands plants cannot be built at a world price of $3 a barrel. We have not decreased the production of oil over the last few years, but with natural gas we certainly have. If you look at discoveries of oil announced in the last several weeks, bearing in mind the long time lag between the price incentive change, the drilling process, and actually finding oil, I think it's clear that supply is price-responsive, that is, if the price goes up there will be a tendency to look for and perhaps find more oil and certainly more natural gas. Whether that constitutes a price schedule that is price-elastic, whether we find proportionately more oil for a given price change, I don't know.

On the demand side, although prices have greatly increased demand has also increased. There are a lot of elements that affect demand, not just the price. As I said the price of gasoline from January 1973 through June 1979 in Toronto went up by only 1 per cent in real terms while income was growing. I think any economist would tell you that an increased demand for gasoline would therefore be expected. By continuing to shelter Canadian consumers from the increasing opportunity costs of those resources we are not going to have the conservation effects this country needs and has agreed to.

As to the natural price: what's natural about OPEC prices? After all, it is a cartel. As much as anyone in this room, I would rather the price was 40¢ for oil, but there is nothing we Canadians can do about the world price of oil. We used to be able to do something about the price of nickel when we were the cartel; some have suggested that we have done it in uranium. But the world oil price we have to accept as given.

Suppose Canada were totally self-sufficient in oil, that we could produce as much oil as we wanted to consume over the next fifty years and export some too, what would I say about the price of oil for domestic Canadian consumption? I would still argue that even if we were a net exporter for fifty years in oil alone we should raise the price of domestic oil in Canada to world price levels, for two reasons. First, the barrel that we consume domestically can be exported and could in that case earn $26 rather than $15. Second, consumers should be facing the true opportunity cost, that is, the price set by OPEC since we cannot change it. Keeping the Canadian price below the price of imported oil amounts to a subsidy. The federal government is laying out billions of dollars a year for that. I can't see how you can say that is not a subsidy. There are two subsidies in oil. There is the direct subsidy paid to importers for the oil that they bring in from Venezuela and Iran and maybe Mexico. That subsidy is given in the first instance to Imperial Oil, which pays $26 and so gets back the difference between $15 and $26. It is then passed on to consumers in a lowered price of oil in Canada. By keeping the price of Canadian domestic oil below world levels there is an indirect subsidy, because that oil could be sold at a higher price to someone else. By selling it at a lower price to Canadians, we are subsidizing it.

As for what do we do about the profits from this and about foreign ownership, I shall say more when discussing the paper by Wilkinson and Scarfe.

My point is that there is another way of subsidizing, and that is through income. I would rather have us subsidize through income the poor and those firms that are especially hurt because I think that keeping down the price of oil in Canada subsidizes a lot of people who do not need that subsidy and by exaggerating demand it makes these unfortunate effects even greater than they would otherwise be. In moving to world price levels we decrease the amount of the subsidy. If we can find some solution to sharing the rents, we could do it in a more equitable manner by giving to the poor directly.

TOM WILSON: I was not recommending a price increase of $2 a barrel per year for the indefinite future. The comparison I reported last night was between moving to world prices immediately as against a $5 increase next year followed by successive $4 increases. The difference is not quite as great as you implied.

You recommend a net profits tax as a mechanism for capturing rents without creating inefficiencies. I was interested in footnote 29 which points out that a profits tax is a tax on the return to a specific factor as well as on economic rent. Now the specific factor is equity capital. You say those disincentives effects are small compared to those with a gross royalty. But there's a problem here. If we are to recapture the lion's share of the rents that would otherwise accrue to non-residents (which would then invalidate the conclusion that we should move to the world price) we must have a very high rate of net profits tax. If we had a very high rate, say a combined federal and provincial rate of 85 to 90 per cent, how would you conclude that the disincentive effects would be small? Would you not instead recommend that in this case, rather than having a tax on profit, we explicitly state that the tax is on rent where there is an allowance for the deduction of the cost of equity capital.

LEONARD WAVERMAN: What I am trying to say is that the net royalty would be calculated after the cost of capital has been incorporated.

TOM WILSON: Including equity capital?

LEONARD WAVERMAN: Including equity capital yes. That is the way the Ontario mine tax operates or the Manitoba tax. I think Manitoba's is an 18 per cent base profit. Some people may argue about what's in that base, but I think the amount is 18 per cent.

I would stick with the net royalty to get around the problems. If we replaced the present gross royalty system with a 90 per cent combined federal and provincial income tax, that would have serious disincentive effects also on the margin because producers would not be able to capture back the cost of their capital. But I think both schemes are the same if we allow a deduction for the cost of equity capital to be taken off the top before the net royalty is calculated.

On net royalty as against gross royalty, Alberta is probably the owner of 80 per cent of the oil, gas, and mineral rights. I think one reason why the gross royalty was favoured initially over the net royalty was that before 1973 net royalties were not deductible before determining federal income tax, whereas gross royalties were.

Of course both are now on the same footing, so maybe the disincentives in moving to a net income tax basis have changed. But I agree with your comments.

QUESTION: In your application of the price of oil going to world prices I assume you would have the price of natural gas following. I'm rather surprised, therefore, that your chart neglects those industries that use natural gas as a feedstock. In particular, in the fertilizer industry in Ontario the price of natural gas represents about 60 per cent of the cost of production of ammonia. If we proceed with this type of pricing the fertilizer industry in Ontario will be out of business within two years.

LEONARD WAVERMAN: The industries for which I did simulations were two-digit manufacturing. industries; fertilizer is a three- or four-digit industry, and we don't have the data to run this simulation. Certainly there are specific industries such as cement and fertilizer which use energy as a feedstock and as a motor fuel, and for some of those industries energy and fuel costs represent a very significant percentage of total cost.

I'm not denying that some industries will be particularly hurt by rising energy prices. On average - and averages are very misleading - the costs of manufacturing would go up 3 to 5 per cent in Ontario with a 35 per cent increase in the price of residual and keeping the price of natural gas at an 85 per cent lockstep

Although I think the case for subsidizing the poor is fairly clear, the case for subsidizing firms seems less so. If it can be shown that firms will be especially hurt and cause significant regional unemployment effects in Ontario, then a case can be made for a transitional loan or a subsidy. The question is whether the market should discipline firms or whether they should be sheltered from world prices.

QUESTION: I take it that only the direct costs of energy were included in your tables. Is it possible to carry that kind of analysis including the indirect costs through to the industrial sector to see what kind of percentages would result?

LEONARD WAVERMAN: That's a very good idea. What was done in the second simulation was to increase the price of materials by 3 per cent to try to capture the effective energy price rises on materials. But that was truly makeshift; I had no basis for that judgment. The model did not incorporate moving through the input-output table, but that could be done. I think something like it has been done by Campbell Watkins, who I believe found a somewhat greater increase. I think he found a 4.7 per cent increase in manufacturing cost with the same kind of price increases that I'm talking about; the range I estimated was 3 to 5 per cent, so we're in the ball park. But it could be done specifically. We could go through the input-output table for each of those industries, find the direct and indirect energy expenditures, and then move it through our manufacturing models to find what the impact would be. It would certainly be higher than what I said.

QUESTION: I was very interested in the comment that natural gas is such a high expense in producing ammonia that the fertilizer industry is going to be out of business in two years. I disagreed with your answer. I thought you would say, 'well, so be it. That's what the market's all about.' To use up natural gas producing something that's not worth its price is a foolish thing to do. If one-quarter of all human wastes were treated and recycled we would have more fertilizer than we could use. Would you agree or disagree with this?

LEONARD WAVERMAN: In general I agree. Market economists always tend to allow the market to discipline firms. However, in this case I'm reluctant to say that because the benefits and the costs are distributed so unequally across Canada that there is a case, though not for every firm, if the price of natural gas went up, for having that amount returned in dollars from the federal purse. For firms that are especially hurt and as a result that may cause substantial regional unemployment a case for a transitional subsidy can be made, but that subsidy should come from the benefits of the price rise.

QUESTION: Do you wish to respond to the panelists?

LEONARD WAVERMAN: Before Campbell Watkins was halfway through it occurred to me that we all agree, and if economists and non-economists agree we must clearly all be wrong.

I think his last points negated his arguments in support of the price royalty system. If we have to give Syncrude projects and non-conventional oil projects a special dispensation, will we have to negotiate special arrangements for a high-cost product? Will we have to have a levy of 33¢ per barrel on every barrel of oil sold in Canada so that Syncrude can sell at world price levels? If so the present royalty system is not operating well. I think if we allow prices to go to world price levels and adopt a fairly simple but complex net royalty system then we should not engage in any more special negotiations. There ought to be no special deals. If you can produce at the world price under the royalty arrangements, then do so. If you can't then don't come to the public purse for money. The present system is really open to manipulation. Having firms come and say that the present royalty system is too high for them, that they need a special deal, shows, I think, that we are moving too quickly to non-conventional resources where we could have secondary and tertiary recoveries. Maybe other basins in Alberta could be discovered if the world price was the one producers faced.

Taxation and Energy

T. L. Powrie

This paper discusses taxation in a broad sense, including not only conventional taxes but also the closely related matters of royalties and price-regulation. The discussion is almost entirely about the example case of oil. Four topics are surveyed: The magnitude of changes in flows of revenues resulting from changes in the price of oil; taxation and the efficient allocation of resources to the production of energy; taxation and the equitable distribution of revenue from sales of energy; macro-economic effects of changes in policies toward taxation and pricing of energy.

MAGNITUDE OF FLOWS OF REVENUE

Table 1 sets out the amounts and regional pattern of the original sources and final destinations of oil and its products in Canada in 1978. On the basis of these volumes Table 2 shows the direct financial implications of $2 per barrel increase in the price of oil in Canada. Obviously, regions that are net importers lose and net exporters gain from the increase. In order to suggest the relative importance of these gains and losses, they are also shown as percentages of the estimated gross incomes of the regions affected. It is apparent that even a $2 increase has significant effects; for a $10 or $12 dollar increase, which would bring the Canadian price near the world price, the numbers would all be five or six times larger.

The effect on the federal budget from an increase in the domestic price of oil occurs through the federal policy of an export tax and import subsidy. For consistency with a $2 domestic price increase, the rate of tax on exports and the rate of subsidy to imports would both have to be reduced by the same amount, and there would be a net saving in the federal budget because the volume of imports is larger than the volume of

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I would like to acknowledge the considerable assistance of B.L. Scarfe in the preparation of this paper, but its shortcomings are my own.

TABLE 1

Sources and disposition of crude oil and petroleum products by region, Canada, 1978 (millions of barrels)

Canadian sources of crude oil production	Region	Domestic disappearance of petroleum products
-	Atlantic	87.8
-	Quebec	182.8
0.6	Ontario	217.7
3.8	Manitoba	21.7
60.5	Saskatchewan	25.0
442.3	Alberta	56.9
13.7	British Columbia	63.7
0.9	North	4.1
Sub-total:		
521.8		
Trade in oil and products:		
Imports 243.5		
- Exports -144.6		
Change in inventories, etc.:		
39.0		
659.7	Total Canada	659.7

SOURCE: Compiled from Statistics Canada, Crude Petroleum and Natural Gas Production (26-006) and Refined Petroleum Products (45-004)

exports.

These striking financial effects arise from changes in the price of oil alone, without allowance for associated changes in the price of natural gas or other sources of energy.

TAXATION AND EFFICIENT RESOURCE ALLOCATION

Taxes or royalties and the profit motive

Taxes and royalties are fundamentally different in some respects, taxes

TABLE 2

Net direct effect on gross income by region resulting from a $2 increase in

Region	($ million)	% of total income
Atlantic	-175.6	-1.3
Quebec	-365.6	-0.7
Ontario	-434.2	-0.5
Manitoba	- 35.8	-0.4
Saskatchewan	+ 71.0	+0.8
Alberta	+770.8	+3.0
BC and North	-106.4	-0.4
Federal budget	+197.8	
Value of change in inventories, etc.	+ 78.0	
Total Canada	0	

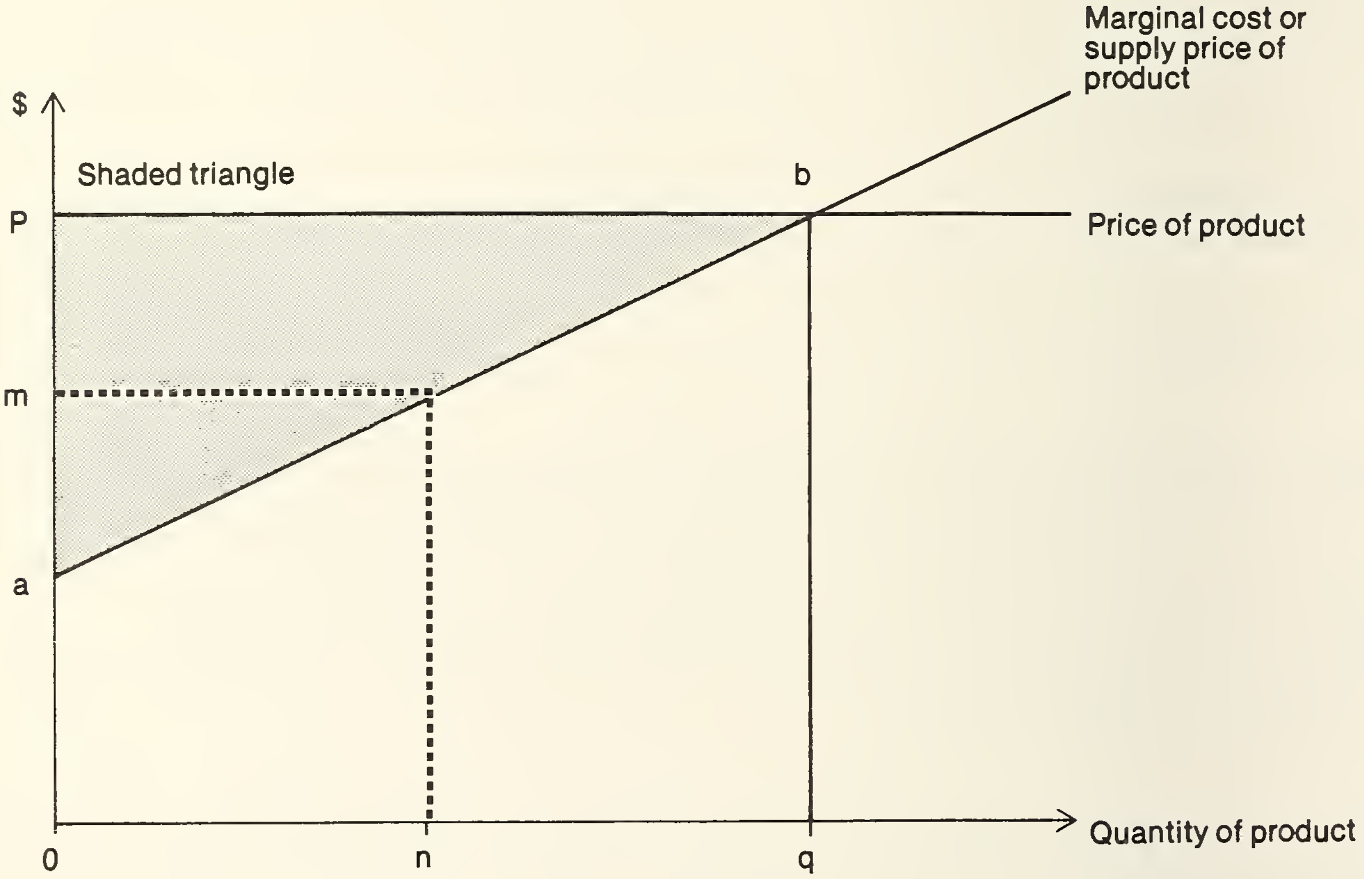
SOURCE: Calculated simply by applying a $2 price increase to the volumes in Table 1. The improvement in the Federal budget is the net result of saving $2 per barrel of import subsidies and losing $2 per barrel of export tax. Provincial gross incomes for 1978 were estimated by dividing Canadian 1978 GNP according to provincial shares of 1977 GDP, the latter from Statistics Canada, Provincial Economic Accounts.

being a unilateral transfer that is not part of the national income, and royalties being a purchase of property rights and a contribution to the national income. However, they are lumped together here because, especially given public ownership of natural resources, they are practically indistinguishable in their effects on the profitability and incentives of private firms.

Efficient resource allocation requires that any product be produced in the amount at which its marginal cost is equal to its price. For an internationally traded commodity the relevant price is the world market price, even when that world price is the result of a cartel if the cartel is likely to persist. (It would be efficient to ignore a merely transient increase in world prices in the planning of long-term domestic projects; but the OPEC cartel does not seem transient).

If markets are reasonably competitive, if externalities are small, and if taxes or price controls do not distort private decisions, then profit-seeking firms will tend to bring about an efficient allocation of resources. In the process they will create a flow of economic rent or producers' surplus, if their industry is subject to diminishing returns, in an amount illustrated by the shaded area pba in Figure 1.

FIGURE 1

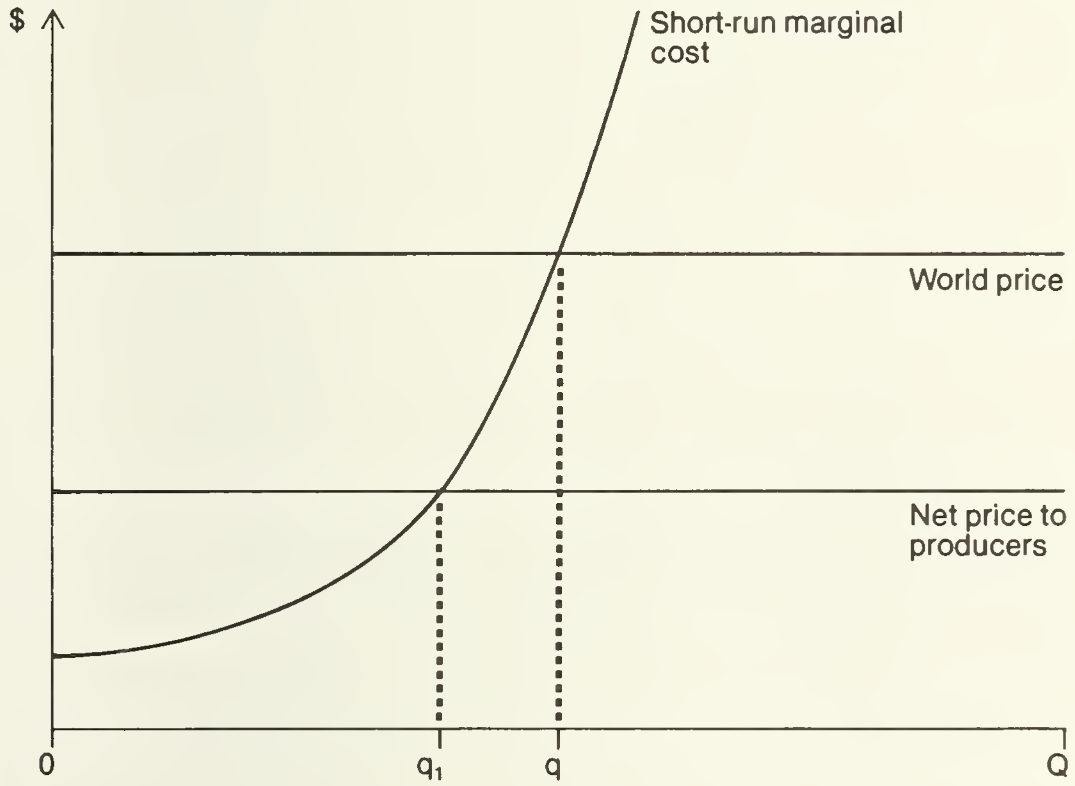


In principle, each unit of product, say each barrel of oil, has its own cost of production or supply price. Producers would produce the first barrel for only \$0a, the nth barrel for only \$0m, and so on; only the qth barrel requires \$0p to call it forth. If every barrel is sold for \$0p, surplus revenue is generated (the shaded area pba), and this is the source of royalties or rent to the landlord. If the surplus were collected with perfect skill at a different rate on every barrel, 100 per cent of it could be collected by the landlord without disturbing the producers' incentive to produce 0q.

Unfortunately, such perfect collection of rent is not feasible. It would require exhaustive information and intimate monitoring of the producer's producers' activities and costs by the landlord. Information and monitoring are expensive, prohibitively so as they approach perfection. The landlord must look for some device of rent-collection that will maximize his income net of collection costs, rather than his gross rent.

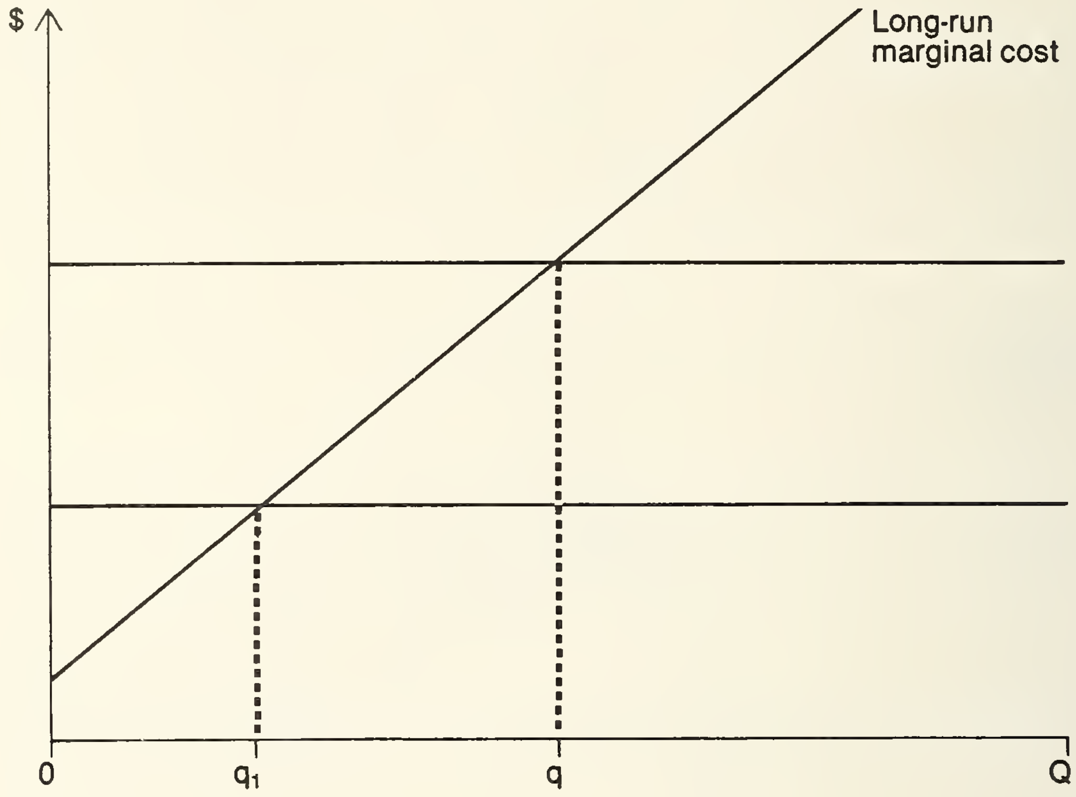
Very crude devices will work rather well in the short run in the case of production of crude oil, because the short-run marginal cost of production rises steeply, as in Figure 2. A simple percentage royalty on all production will not greatly reduce the volume of production from a given, already developed, number of fields and wells. That is, in the short run of Figure 2 even a heavy rate of straight percentage royalty or tax may lead to only a small shortfall of q' below q. In the long run, when costs of exploration and development must also be taken into account, Figure 3 is relevant and illustrates that a simple percentage royalty can cause a major shortfall of q' below q.

FIGURE 2



Artificial maintenance by fiat of a low domestic price has the same

FIGURE 3



effect. In the short run it benefits domestic consumers while causing only minor shortfall of production below its efficient volume. In the long run it can be expected to have severe effects on production.

Sale by auction of mineral rights and profit-sharing in lieu of royalties are two devices by which a landlord may collect a substantial portion of the rent with moderate collection cost and without adverse effects on the volume of production. Do-it-himself production is of course a third, which means, in the case of natural resources, publicly owned producers. There is no perfect device for transferring rent from producers to government or to consumers, but fixed percentage royalty and price control are among the worst devices in their effect on efficiency of allocation.

Taxes or royalties and sources of finance

Separate from and more controversial than the idea, discussed above, that a firm must be able to expect a reasonable future profit as an incentive for new investment, is the idea that a firm must have a substantial accumulation of past profit as a means of financing new investment. The latter idea implies a need for much wider profit margins than the former one. It is controversial because against the usual presumption in favour of more equal distribution of wealth it throws the counterargument that only concentrated wealth can or will undertake some socially important projects.

There are three possible arguments for abstention by government from some tax or royalty revenue in order to permit wider profit margins for reinvestment by energy companies.

First, one could argue that households and governments collectively save too little, compared with the nation's needs for new savings, and therefore that it is necessary to add some 'forced savings' to the national pool in the form of extra corporate profits, which, one would have to insist as part of the argument, must not be distributed as dividends. Canada uses foreign-owned savings to finance about one-fifth of its gross investment every year. This does seem excessive and a reason to take steps to increase domestic savings to reduce the growth of foreign debt. However, national saving could be increased, with less conflict with the goal of equity, in the form of reduced government deficits or increased government surpluses rather than in the form of increased retained corporate profits. (It follows from this point that increased government revenue from oil and gas should accrue to the government most likely to save it rather than dissipate it in subsidies or other current expenditure). Anyhow, even if extra corporate profits were judged an appropriate means in principle to reduce Canadian reliance on foreign-owned savings, they would not be an appropriate means in the oil and gas industry, where most of such extra profits would themselves be foreign-owned. It is mere truth, innocent of chauvinism, to say that a country cannot increase its domestically owned savings by giving extra revenue to foreign-owned firms for them to save.

A second possible reason for allowing private firms additional earnings by reduced taxes or royalties would exist if there are failings in the system of financial intermediaries. If the intermediaries fail for any reason to direct new savings toward the most desirable new projects, then society may have to permit the relevant firms enough internally saved funds to finance these projects themselves.

As an extreme case of this argument, suppose there are no financial intermediaries at all in an otherwise capitalist free-market economy. Then the only way any firm could expand its capacity would be from retained net earnings, and the only way any firm could use its retained earnings would be expansion of its own capacity. A shortage of any product would cause an increase in the price of that product, an increase in the retained earnings of that industry, and thus an expanded output by that industry. The system would succeed in adjusting production to demand, albeit more slowly than in a situation where funds could also be borrowed on the basis of expected profits without waiting for realized profits.

In a less extreme case, where financial intermediaries function well for most forms of investment projects but not for all, ample retained net earnings in the industry ill-served by intermediaries would be a means of correction of the financial market's failure.

I do not know enough about its financing to judge whether the oil and gas industry would qualify under this argument for tax or royalty relief. The high-risk parts of the industry (exploration and development of new technology) presumably require a relatively high ratio of equity to debt, and Canadian financial intermediaries are often accused of aversion to equity and risk, whether justly or not. The argument is complicated by the usual objections to tax relief for the already affluent, by the fact of foreign ownership of a large portion of any relief provided, and by the need to appraise alternative means of coping with risk, such as joint ventures.

The third possible reason for tax relief to permit extra retained earnings to finance investment has to do with externalities, that is, benefits (or costs, but in this instance benefits) that accrue to third parties from an investment project although the third parties cannot be made to help pay for the project. An analogy may be of interest here. Academic research is very risky, with a very high proportion of dry holes. But when a rich discovery is made it cannot long be kept as the private property of the discoverer and is soon available to all users free of charge. The problem of risk might be privately overcome by various risk-pooling arrangements, but the fact of externalities means that no one group has enough private incentive to undertake research because it cannot capture all of the benefits from it. Both as a means of risk-pooling and because of externalities, academic research is subsidized by society through government, under arrangements in which the researchers themselves typically bear none at all of the financial risk inherent in their activity.

Exploration and technological development in the oil and gas industry are also risky and likely to yield external benefits. They are, essentially, research. There is good reason to use public funds to pay private firms to do more of it than market incentives would encourage them to do. Relief from taxes or royalties is one way to do this. To an outsider, these forms of relief, such as depletion allowances or superdepletion, have a bizarre complexity. The rules no doubt provide the government with some control over the direction of the research it is fostering, although one wonders whether there may be more straightforward ways of doing this. The main point is, however, that this rationale for extra corporate profits requires that the information discovered be made publicly available. This rationale is not disturbed by the fact of foreign ownership; research support should go to whoever does the job best, as long as the results are made public.

Prices and consumer behaviour

The need for restraint henceforth in consumption of oil and gas is best met in the long run by raising the consumer price of these items to world levels. The increase will cause hardship and opposition. The only relief here is that the increase need not be immediate to be effective, as long as there is an immediate clear knowledge that it will occur over two or three years. The reason is that, like production, consumption of energy is associated with large short-run fixed costs that make it insensitive to price in the short run. Therefore, immediate price increases involve mostly extra expense with little conservation. But long-run increases, including clearly announced future increases, can cause more effective conservation through changes in patterns of consumer investment in durables.

The following casual calculations illustrate the point. On a 200-mile drive a driver might save at most two gallons of gasoline by driving at 50 mph instead of 65. By driving at the higher speed he saves fifty-five minutes of driving time, which he values at, say $10. The two gallons of gasoline saved would have to cost more than $5 a gallon before the saving of gasoline would be worth more than the loss of time from slower driving. But this calculation is based on a short-run fixed item, namely, a given car. In the long run, the choice of a new car arises. Suppose the new car is expected to run fifteen thousand miles a year for five years. With a discount rate of 5 per cent a year, the discounted present value of the fuel saved by a 30 mpg small car compared with a 20 mpg larger car is

$1082 an amount large enough to weigh seriously in the choice. In other words, increases in the price of fuel affect consumption only with a delay while consumers 'retool.' Therefore, the hardship of immediate price increases is not necessary to conservation, as long as the increases are clearly announced so they can be taken into account in the 'retooling' decisions.

Canada has been stretching its use of this source of short-run relief from more expensive energy. It is six years now since the first major increase in oil prices (in 1973), and we are still far short of world prices. A clear commitment to reaching the world price in, say, three years, is overdue, for the sake of efficient planning by both consumers and producers.

TAX, PRICES, AND EQUITABLE DISTRIBUTION OF INCOME

As we have seen, a $10 or $12 increase in the price of a barrel of oil in Canada, together with associated changes in the price of natural gas, would transfer several billions of dollars a year from the rest of the economy to Saskatchewan and especially to Alberta. Even the present magnitude of oil revenues has led to questioning of the right of provincial governments to the income from their own natural resources. That questioning will become more severe as the price of oil rises toward world levels.

Sharing should be and is a basic feature of confederation. This is not seriously in dispute. For example, Alberta's net provincial exports of oil and products in 1978 were 385 million barrels, and the Alberta economy received some $4.2 billion extra by selling them at a price of around $14 instead of the pre-OPEC price of around $3. At the same time the Alberta economy gave another $4.2 billion or so to the rest of the country by selling at $14 rather than at the world price of about $25. This is roughly 50:50 sharing of the world price of oil between Alberta and the rest of the country, and all production costs and federal income taxes come out of Alberta's half. Debate about these arrangements is about the form and proportions, not about the principle, of sharing.

We need a rule for the sharing of provincial natural resource revenue, to avoid the uncertainty and divisiveness of the present procedure of negotiated short-term compromises. W.D. Gainer and I have suggested such a rule, in Canadian Public Policy (Winter 1975), and I suggest it again here with a little enlargement. Provinces should pay to the federal government the proportion of their natural resource revenue that would be paid in federal taxes if the natural resource revenue were privately owned. This rule should apply to all provinces and all natural resources. In the case of oil, it would replace present procedures for sharing, namely the differential between the domestic and the world price and the disallowance of provincial royalties in the calculation of federal corporate income tax.

The BNA Act prohibits taxation of one government by another. But modern governments have two kinds of income. One is transfer payments, one-sided transactions which do not create national income but merely reallocate its ownership. Taxes are the prime example. The other is factor earnings, the result of two-sided transactions in which payment is made to purchase productive services and which are the original source of national income. Factor earnings consist of wages, rent, interest, and profit. They are the ultimate tax base. In 1867 it was likely presumed that any government's revenues would consist almost entirely of transfer payments or taxes, and it was and is unwise to let one government tax another's taxes. But today, governments also earn substantial factor incomes from their various involvements in the economy, and there is no reason to exclude one government from part of the ultimate tax base merely because another government happens to own it.

It is very difficult to amend the BNA Act, but it would not be necessary to do so to change the effective rules. A negotiated agreement for 'special payments' by the provinces to the federal government would suffice. Even that agreement would be difficult to achieve, but there do seem to be benefits to all participants to provide the incentive. The federal government would receive revenues. Alberta and Saskatchewan would receive a more stable and predictable set of rules for the sharing of oil revenues that they are obliged to share anyhow under present arrangements. The other provinces would receive the comfort of seeing an assured share of oil revenues go to the national government with little loss of their own rights to their own natural resources.

What factor earnings should be included in the agreement? Governments do not earn wages, so those are not at issue. Interest income raises problems. If interest income were added to a province's 'taxable' factor earnings, then interest payments would be a deduction from them, and the scheme would in effect encourage provincial governments to run budget deficits by reducing the cost of doing so. It would therefore be sensible to adopt the crude but simple principle used in national income accounting and say that any interest on government debt is deemed to be transfer payment, not factor income. As for profit, the profits earned by government business enterprises are already subject to some intergovernmental payments of taxes or payments in lieu of taxes, so no new principle is involved in including them, although tidying of the rules may be possible. The main item, perhaps the only one big enough for urgent consideration, is rent in general and natural resource revenues in particular.

The actual rate of federal 'tax' to apply to provincial factor incomes would be a central point for negotiation, as there is no clear answer what it should be. In principle it should be the same rate as if the factor incomes were privately owned, but that principle is muddy in application because the rate would vary as the private owners were large or small corporations or more or less wealthy households and as the revenues were considered to be income from renewable resources or capital gains from sale of exhaustible resources. At the upper end of plausibilities, one finds 36 per cent, the rate of federal tax on corporate income after provincial tax credit. At the lower end, 14.5 per cent is the average federal tax rate on everything, that is, the percentage that total federal tax collections were of GNP in 1978.

One should note that similar federal-provincial sharing of resource revenues could be achieved by an appropriate degree of federal disallowance of provincial royalties as expenses for purposes of federal corporate income tax, combined with an appropriate degree of provincial restraint in setting royalty rates. Federal-provincial co-operation would be necessary in working out these appropriate degrees.

Movement to the world price of oil would have awkward consequences for the program of federal-provincial equalization grants because the effect on Alberta's provincial revenues would greatly raise the cost of the grants needed to bring all provinces up to the national average per capita provincial revenue. Plausible rates of federal sharing of provincial resource revenue would reduce but not remove this problem. To achieve sensible results from the equalization grants formula, it seems necessary to bear in mind that oil and gas revenues come from exhaustible resources and therefore are capital gains or even mere liquidation of assets and should not be included fully in any regular current income account.

THE PRICE OF ENERGY AND INFLATION

One difficulty in moving the domestic price of oil to the world level is the aggravation by this move of the already serious problem of inflation. A $10 increase in the price of the 660 million barrels of petroleum products used in Canada in 1978 would cost $6600 million, which is about 2.8 per cent of the 1978 GNP at market prices. That is, a $10 increase in the price of oil would impose a direct 2.8 per cent cost-push on the national price level, not to mention the indirectly resulting inflationary pressures from attempts of other sectors to catch up.

There is no escape from this difficulty. It is not even clear that a gradual increase in the price of energy would be less inflationary than an abrupt one, because of the volatile nature of expectations. That is, three annual cost-pushes of 0.9 per cent each could create a more stubborn increase in inflationary expectations than one single increase of 2.8 per cent in the same period.

Suppose the domestic rate of inflation depends on four items, in this order of importance: (1) general expections of inflation, based on past experience of it; (2) devaluation of the Canadian dollar, directly raising prices of imports and export-type goods; (3) the level of employment; and (4) increases in the price of energy. Nothing can be done directly about item (1). Therefore, if the price of energy is increased there must be offsetting changes in items (2) and (3) to prevent aggravation of inflation.

There are two alternative general directions of macroeconomic policy in response to an increase in the price of energy. One puts priority on resisting inflation, the other on restraining unemployment and encouraging domestic savings.

The policy that emphasizes resistance to the inflationary effect of higher energy prices would, first of all, maintain or strengthen the external value of the Canadian dollar to avoid or reverse cost-push from our foreign trade. The only way to do this in the short run is with tight money policy and domestic interest rates high enough to attract increased inflows of foreign capital. Thus one by-product of this approach to more expensive energy is more rapid growth of international indebtedness, and another is the depressing effect of higher interest rates on domestic capital formation. Unemployment would increase too because of the tight-money policy through its effects on investment spending and on exports and imports via the exchange rate. It is quite possible that tax cuts (a stimulative deficit?) would be required to prevent unemployment from rising too far, although it would have to remain high until the inflation was controlled. The costs of more expensive energy, in this approach to fighting its inflationary effect, are greater international indebtedness and a more prolonged period of high unemployment before inflation is controlled. Also, potential additional savings out of extra oil revenues are offset by increased government deficits and thus are not available to finance added investment.

The alternative emphasis in a macroeconomic policy response to higher energy prices is more inflationary but more attractive in other respects. The extra revenues from higher energy prices are a significant source of additional savings. Let these accumulate as fully as possible as government surpluses or reduced government deficits, without offsetting tax cuts, to increase the national savings. Then an easing of monetary policy, combined with the additional supply of loanable funds, would lower interest rates, with two further effects: a stimulus to domestic capital formation and a reduction in net borrowing from abroad. Reduced foreign borrowing would cause the Canadian dollar to weaken in foreign exchange markets, and this in turn would narrow the deficit between exports and imports. Employment would be stimulated by higher investment, higher exports, and lower imports. Inflation would be aggravated both by higher employment and by devaluation of the dollar, and further tax increases would possibly be needed to restrain aggregate demand and employment. The whole approach would have to be applied with moderation to avoid serious aggravation of inflation from the strong effect of the foreign exchange rate on the domestic price level. The cost of more expensive energy in this approach is more prolonged inflation, with some reward in the form of greater domestic savings from the energy revenues.

D. G. Hartle

Any model that claims to be the only source of rationality, as a monopoly model, I get very twitchy about. It is true that the issues are largely quantitative, but I don't think it really matters very much whether it is twenty billion or 150 billion or whatever, the numbers are extraordinarily large. If you give me numbers carried out to a tenth of a point in areas as big as this, I say you are not accepting the uncertainty in this world and pretending it is more concrete than it is.

I'd like to speak about Professor Powrie's paper. He believes the natural resource revenues of provinces should be taxed. I think that is the issue that has to be faced. It is not confined to natural resource revenues; it also extends to crown corporations.

I find it strange that people who consider themselves conservative don't turn to obvious things like taxing a government enterprise when it happens to be a landlord, or a producer of electric power as in Ontario. They pretend these should not be taxed, whereas other enterprises should be.

My idea of imposing an excise tax, to try and get at the secondary and tertiary reserves is in a sense a crude way of imposing roughly a 50 per cent tax rate on those additional revenues. Its a very crude way because if the federal government on behalf of taxpayers generally had been taxing these resources from the beginning - the revenues of the provinces - at 50 per cent (or the going rate, it doesn't make any difference) this problem would not have existed. Until we come to grips with taxing provincial revenues I think we will be looking at extraordinarily convoluted solutions.

Professor Powrie takes the BNA Act as a sacrosanct. But his proposal that these revenues be taxed is completely inconsistent with the BNA Act as most people read it. One crown cannot tax another. But to me this is the fundamental issue - how we are going to tax the revenues of provincial ownership of resources or provincial enterprises. Until we settle this question we will find increasing complexity in our system.

As far as the interest income of the Heritage Fund is concerned, in many ways I go right back to the Carter Commission report. There is no need for a corporate tax, except as a withholding tax, to get our share of the benefits of foreign investment; it should be attributed out to individuals. If we do not do that we will find in the Province of Alberta an adjustment process taking place: they have enormous revenues; they have low taxes; they have good services; and people will move there. Essentially they will have a vast migration of people tied to the inability to share these particular rents around the country. So they may gain in one respect, but I think in the long run the adjustment of people to incomes will mean that we have to discard social capital in one part of the country and create it in another to no great effect.

It is important to Albertans, I think symbolically, that they have industrial structure. All developed countries symbolically have to have an airline, a cement plant, a steel plant, a petrochemical industry. They should have it. It's what they want, and I suppose that's what they should get. I think when they have it, along with the congestion and pollution that go along with it, things won't turn out to be quite so simple. They will have their monuments; but they will pay for them.

I think if we went to a rent-tax system, many of these adjustments would fall into place. But I don't think it is possible at this time to get the federal government to move into the taxation of the natural resource revenues of the provinces, which is precisely what needs to be done, attributing the incomes of provinces acting as investors out to the shareholders, in this case the residents of the province.

J. F. Helliwell

In the spirit of Tom Powrie's paper, which is as much about energy pricing as about energy taxation, my commentary will attempt to show the interaction of energy pricing and taxation policies. The main substance of my contribution is to be found in Table 1 and its explanatory notes.

Case 1, the base case, represents an attempt to depict the total size and distribution of the economic rents arising from Canada's non-frontier sources of conventional crude oil and natural gas. The model used for analysis[1] accounts for all expenditure, production, and revenues since 1948. All periods prior to 1980 use historical tax, royalty, and pricing systems, while future results are derived for the base case on the assumption that existing tax and royalty arrangements will continue to apply in the future. The base case price assumptions for crude oil are that the wellhead price per barrel will rise by $4 annually in 1980, 1981, and 1982, and then by $5 annually until parity is achieved (in 1985) with the world oil price. The world oil price is taken to be $29.25C per barrel in 1980 ($25US), and to rise thereafter at 8 per cent annually in nominal terms. This 8 per cent is the sum of an assumed 6 per cent general rate of inflation plus a 2 per cent 'real' increase in the price of crude oil. The wholesale price of natural gas at the Toronto city gate is assumed to rise so as to maintain its current 85 per cent relationship (in terms of BTU equivalence) with domestic crude oil delivered to Toronto.

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[1] The earliest available written description of the UBC integrated energy model is in Helliwell et al. (1976). The demand equations of the model are described in McRae (1980), and the more recent structure and uses of the whole model are outlined by Helliwell et al. (1979).

Given the prices of the various forms of energy, and the future volume and price of Gross National Expenditure, the equations of the model forecast the future demands, in each of Canada's five main regions, for all primary forms of energy. Production flows for natural gas are then made equal to domestic demand plus existing approved exports.[2] For conventional crude oil, production is made equal (for as long as deliverability permits) to demand in Ontario and the western provinces, plus approved exports, plus the throughput of the Montreal pipeline extension, less the output from the Syncrude and GCOS oil sands plants. When western oil production is no longer sufficient to keep the throughput of the Montreal extension at 350,000 barrels a day, this eastward flow is gradually reduced and then eventually reversed. Crude oil imports are thus equal to demand in Quebec and the Maritimes minus the eastward flow (or plus the westward flow) of the Montreal extension.

The results in Table 1 show the present values of economic rents measured as at the end of 1980, in terms of billions of end-1980 Canadian dollars. It should be clear without stating that the calculated values depend upon a large number of assumptions and calculations based on uncertain forecasts. Some of these forecasts extend far into the future, as the simulations are run to the year 2036 to complete the production and revenue allocation of the NEB forecasts of ultimate non-frontier reserves of 146 tcf of gas and 16.9 billion barrels of conventional crude oil. However, at the relatively high rates of discount used to find present values of net economic rents (7.44 per cent real, or 13.44 per cent in nominal terms) the effects of uncertainty about the far distant future have relatively little impact on present values.[3]

Column 1 shows the total economic rents from crude oil, from natural gas, and from the two combined. One point worth noting at the outset is

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[2] The consequences of altering the level of natural gas exports are shown in Table 2 of my paper on exports of natural gas and electricity.

[3] For example, $10 billion at the end of the century, discounts to less than $1 billion in 1980.

TABLE 1

Net economic rents from conventional crude oil and natural gas under alternative tax and pricing systems
(Billions of end-1980 Canadian dollars)

		Total rent (1)	All producers (2)	Canadian consumers (3)	(After) waste Of (4)	Federal government (5)	Provincial government (6)	Total Canadian rents (7)
Case 1 (Base Case)								
Domestic oil prices up $4/year for 3 years, then $5/year to world price Domestic gas at 85% of BTU parity with domestic crude oil price	Oil	173	30	42	5	20	80	149
	Gas	181	20	42	18	26	73	145
	Total	354	50	84	23	46	153	294
Case 2								
Domestic oil prices up $2/year for 3 years, then $6/year to world price	Oil	172	28	52	7	14	78	150
	Gas	180	20	44	20	25	71	145
	Total	352	48	96	27	39	149	295
Case 3								
Base case prices Federal crude oil excise tax of $2/bbl in 1980, $4/bbl in 1982, $6/bbl in 1983, $9/bbl in and after 1983	Oil	173	22	42	5	35	73	155
Case 4								
Corporation income tax at same rates as other industries; no earned depletion	Oil	173	15	42	5	34	81	161
	Gas	181	1	42	18	45	73	160
	Total	354	16	84	23	79	154	321

Note: All economic rents are measured as present values of all past and future costs and returns, measured at the end of 1980 in terms of end-1980 prices.

Base Case Assumptions:

- (i) World price equal to $29.25 a barrel $25US in 1980, rising thereafter at 2 per cent a year in real terms. This is less than Canada's export price of $31 a barrel in September 1979 for light crude oil, and less than late-September spot prices of $33-5US a barrel. It is approximately equal to the OPEC ceiling price of $23.50US plus tanker and pipeline charges to Montreal.
- (ii) Natural gas for domestic users (at the Toronto City Gate) priced at 85 per cent BTU equivalence with domestic crude oil delivered to Toronto. Prices elsewhere reflect differences in transport costs and lower prices to BC and Alberta users. In all cases the natural gas prices gradually move towards 100 per cent of BTU parity as the time approaches when Canadian demands are expected to exceed supply from non-frontier sources. In the base case, the approach to BTU parity for Toronto City Gate prices starts in 2018.
- (iii) Natural gas for export sale priced at 80 per cent of BTU equivalence with world crude oil, less costs of delivering natural gas from the Canadian border to Chicago. This price is calculated to be $3.83C/mcf, or $3.27US/mcf in 1980, and to rise thereafter at 8 per cent in nominal terms. This 1980 price is about 5 per cent less than the $3.45US/mcf price announced on 4 October 1979, to apply from exports starting 4 November 1979. It is 10 per cent less than the $3.65US/mcf price announced for sales of Mexican gas to the United States.
- (iv) The general rule of inflation is assumed to be 7.5 per cent in 1980 and 6 per cent thereafter. Real Gross National Expenditure is assumed to grow at 4 per cent annually in and after 1979.
- (v) The nominal discount rate of general inflation (the actual rate is used prior to 1980) plus 7.44 per cent. The latter figure, which is the calculated average real alternative supply of capital to Canadian business, is also used as the after-tax opportunity cost on invested capital when calculating net economic rents to producers. Economic rents to governments are net of an income tax opportunity cost equal to 3 per cent of capital invested. Total rents to the resource are net of a real capital rental charge equal to 7.44 + 3 = 10.44 per cent of undepreciated capital.
- (vi) Domestic wellhead crude oil price raised by $4 a barrel in 1980, 1981, and 1983, then by $5 a barrel a year until equality with world oil prices is achieved. Under the base case assumptions for world oil prices this occurs in 1985.
- (vii) Ultimate non-frontier recoverable natural gas is assumed to reach 146 tcf, following the NEB gas report of February 1979. Ultimate recoverable non-frontier conventional crude oil is assumed to reach 16.9 billion barrels.

Meaning of Columns: Column 7 is the sum of 3, 5, 6 and 21.5 per cent of column 2, where 21.5 per cent was the value estimated in 1976 as the Canadian equity ownership proportion in non-frontier natural gas and crude oil production.

Case 2:
Domestic oil prices move up by $2 a barrel in 1980, 1981, and 1982, then by $6 a barrel annually until parity with world oil prices is achieved in 1986.

Case 3:
Energy prices to users, and hence demands and production, are the same as in the base case. A federal excise tax (which is assumed to be deductible for the calculation of royalties, and for provincial and federal income taxes) is levied, on crude oil only, at the rate of $2 a barrel in 1980, $4 in 1981, $6 in 1982, and $9 in and after 1983. This has the effect of lowering the actual wellhead price by a corresponding amount. The $9 tax in and after 1983 is not indexed to subsequent inflation, and by 1990 it is less than 15 per cent of the pretax wellhead price.

Case 4:
The average federal rate of corporation income tax in and after 1980 is set equal to 36 per cent of the 23.4 per cent rate estimated to apply in the presence of the federal resource allowances. In addition, the rate of 'earned depletion allowance,' which is equal to 25 per cent in the base case, is set equal to zero in and after 1980.

that conventional crude oil is at a later stage of its development and production than is natural gas. Accumulated production to the end of 1979 is 25 per cent of ultimate for natural gas and almost 60 per cent for crude oil. This means that any policy changes affecting future prices, taxes, and revenues are likely to affect natural gas more than crude oil, because total economic rents from the two hydrocarbons are estimated to be about the same.

Column 2 shows the economic rents accruing to the non-frontier producing firms, net of all taxes, royalties, and an after-tax opportunity cost of 7.44 per cent real or 13.44 per cent in nominal terms. No account is taken in these calculations of the expenditures and tax incentives relating to arctic or offshore gas developments. Column 3 shows the net Column 3 shows the net economic rents accruing to Canadian users of oil and gas as a result of obtaining crude oil at less than world prices between 1973 and 1985, and natural gas at less than a BTU-equivalent price from 1973 until about the end of the century.[4] These figures are net of the 'economic waste' calculated and shown for its own interest in column 4.

A crude measure of economic rent to consumers would simply multiply the amount of price discount (relative to the value of the fuel in its most valuable alternative use) by the amount of energy used. The more refined calculations reported in column 4 take account of the fact that consumers use more energy at the low price than they would have done at the higher price, and that the additional energy they use is worth, to them, something less than the higher price but more than the lower price.[5]

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[4] There is an inherent arbitrariness in using BTU-equivalence as a way of setting the 'world value' for natural gas. Pipeline transportation for natural gas is about three times as expensive as for crude oil (for the same BTU content), and the cost differential for ocean transport is even greater given the high costs of liquefaction. Thus the 'equilibrium' price for natural gas will differ by region even within North America, and depends importantly on U.S., Mexican, and Canadian policies for domestic pricing and trade.

[5] Putting the matter more formally, the measure of economic surplus accruing to consumers through pricing at less than world price for crude oil, or its BTU equivalent in the case of natural gas, is obtained by calculating the area under the demand curves between the actual price paid and the world price. Thus, the measure of consumer's surplus is measured net of what it would be at the world price, and hence shows a zero value when the domestic price equals the world price.

Column 5 shows the economic rents accruing to the federal government. The positive flows in this calculation comprise federal corporation income taxes and the oil export tax, while the negative elements include oil import compensation payments and the 'tax opportunity cost.' The latter is equal to what the same amount of capital investment might yield, in the way of federal corporation income taxes, if it were invested elsewhere in the economy. The federal corporation income taxes are calculated to include the effects of the resource allowance, earned depletion, accelerated capital cost allowances, and the non-deductibility of royalties. Column 6 shows the economic rents accruing to the provincial governments of the producing provinces. The positive elements are royalty payments, land payments, and provincial corporation income taxes, with the only negative element being the 'tax opportunity cost' based on what the provincial corporation tax might yield, on average, if the same capital were invested elsewhere in the province.

Column 7 shows the total economic rents accruing to Canadians from crude oil, non-frontier natural gas, and the two combined. It comprises all of the rents accruing to federal and provincial governments and to Canadian consumers, plus about 20 per cent (the approximate Canadian equity share in non-frontier oil and gas production) of rents accruing to the producing firms. The difference between total rents (column 1) and rents to Canadians (column 7) is thus the foreign-owned 80 per cent of producer rents plus, in the case of natural gas, the economic rents accruing to US purchasers of Canadian natural gas exports priced at less than BTU equivalence with world crude oil. The rents forgone[6] by pricing gas at less than BTU equivalence amounted to $10 billion Cdn by the end of 1979 and to about $20 billion Cdn in total under the base case assumption that future exports under existing export approvals will be sold at a price equal to 80 per cent of BTU equivalence with world crude oil.

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[6] The rents actually accruing to U.S. consumers would actually be less than this, because the underpricing of gas (relative to world oil prices) within the U.S. meant that a substantial fraction of the rents forgone by Canadians will have been dissipated in waste in the United States. As we do not operate a model for U.S. energy supply and demand, we have not attempted to estimate the amount of this waste. It is also worth noting, again, that the use of BTU-equivalance with world oil as the measure of the 'no-waste' equilibrium price for natural gas is itself an assumption that may overstate (or possibly understate, if gas is a 'premium' fuel) the amount of rents forgone by the export pricing policy.

Some idea of the magnitude of the net economic rents from conventional oil and natural gas may be obtained by comparing the present values in column 7 to the mid-1979 level of Canadian GNP. The total of economic rents accruing to Canadians amounts to more than total 1979 Canadian GNP, while total rents to the resource amount to almost 1.4 times 1979 GNP.[7] Now that the base case has been established and all of the key assumptions explained, we can proceed quickly to deal with some alternative tax and pricing policies.

Case 2 shows the effects of an initially slower increase in domestic oil prices - only $2 a year from 1980, 1981, and 1982, followed by $6 annual increases until parity with world oil prices in 1986, one year later than in the base case.[8] Natural gas prices also are initially lower, as they are set at 85 per cent of BTU parity in both cases. The total rents to Canadians are actually increased slightly, even though total waste has been substantially increased. Net consumer rents, after allowing for additional waste of $4 billion, are increased by $12 billion. Most of this is a transfer from government revenues; $7 billion from the federal government (chiefly because of the extra oil import compensation payments) and $4 billion from the provincial governments (mainly from lower royalty payments). The natural gas producers are almost unaffected, because although they get lower prices they also get faster production and hence a faster collection of their economic rents. In the case of crude oil, in which conventional production is close to capacity in any event, the lower prices do lead to lower producer rents and hence to a transfer of more than $1 billion from foreign shareholders to Canadian consumers.

Case 3 uses base case assumptions for oil and gas prices paid by Canadian consumers and export customers but imposes a federal crude oil excise tax of $2 a barrel in 1980, $4 in 1981, $6 in 1982, and $9 in and after 1983. This, in effect, means that about one-half of the 1980-4 increases in crude oil prices are collected directly by the federal government, with the remainder being distributed between governments and producers in the proportions determined by the existing tax and royalty system. Energy demands, energy production, energy trade, and natural gas rents are exactly as they were in the base case. The only change is in the distribution of total economic rents from crude oil. Federal government rents almost double, from $20 billion to $35 billion, with the producers and the provincial governments both contributing. Because a substantial fraction of the transfer comes from foreign owners of producing firms, total rents are increased, as shown in column 7.

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[7] As shown in Table 7 of my paper on exports of natural gas and electricity, these values depend importantly on the assumed world oil prices and discount rates.

[8] Case 2 is set up to test the hypothesis, advanced by Tom Wilson, that from the Canadian point of view the benefits accruing to Canadian consumers, and the benefits to producers and governments from the acceleration of energy production and use, are likely to be greater than the losses caused by extra economic waste caused by pricing energy at less than its opportunity cost.

Case 4 tests the effect of removing the resource allowance and the depletion allowance. These changes are made starting in 1980. Since royalties are still treated as non-deductible for the federal corporation tax, although deductible for the purposes of the provincial corporation tax, this raises effective tax and royalty rates substantially. This case gives a 'neutral' tax system of the sort advocated by Douglas Hartle in his paper. The federal corporation income tax rate used is the same as that applicable in other industries. The chief discrepancy between the case 4 tax system and that applicable elsewhere in the economy is that provincial royalties are treated as a 'nothing', or non-deductible expense, in the hands of the firm. The federal government rents for oil rise as much as in case 3, and there is an accompaying increase in the federal share of economic rents from natural gas. The sharp reduction in producer rents would no doubt be offset to a substantial extent by low bids for drilling rights, but this effect has not been modelled.

Tom Powrie suggests in his paper an alternative way for the federal government to gain a share of the provincial royalty payments. His suggestion is to restore royalties as deductible expenses for the producing firms, but to tax them in the hands of the provinces. If the tax rate used is the same as that applicable to other industry, then the federal government result would be the same as in case 4, while the rents to producers would be increased with a matching redution in the rents accruing to the provincial governments.

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Discussion

QUESTION: I am a little concerned about the easy acceptance of the notion that an adjustment of oil prices to world levels would automatically, in general, call for a macroeconomic adjustment. It seems to me that a movement to world oil price levels by itself is just a once-and-for-all adjustment in the over-all price level, which is not accompanied by any reduction in real resources available to the economy, a once-and-for-all increase in price levels to resolve an aggregate spending running wild. It seems to me that such a price adjustment does not necessarily evoke a reaction. It's different from the kinds of price level increase that you would get with, say, a crop failure, where obviously there has to be an adjustment in the standard of living. It is different from the kinds of price level increase you would get if aggregate spending took off. So I wonder whether there isn't a distinction to be made here between different types of inflation?

T.L. POWRIE: The rational expectations school of theories of inflation would, I think, agree with you Mr Galbraith. If it is just a one-shot increase and everybody knows it is and is willing to accept it, then there would be no need for further macroadjustment after I guess something like a 3 per cent increase in the general price level on going to world prices of oil. There would be a need for macroeconomic policy to counteract the resulting inflation if that initial shock caused a change in expectations or a general struggle for everyone else to catch up. Again it would not be a once-and-for-all increase in the price level; it would be a continuing aggravation of the rate of inflation that we would have to do something about. I think the latter is more realistic.

D.G. HARTLE: It seems to me that Tom Wilson is rightly concerned about the effects of the price increase on wage demands, the effect of higher wages on Canada's competitive position, and so on. One solution seems to me to be to let Canada go to the world price and capture the rents for the average citizen. Nevertheless one could offset it over a period of two or three years reducing other forms of taxation, particularly retail sales taxes or manufacturers' sales taxes, which are pushing the price up. If you offset the one with the other at roughly the same magnitude it won't be as simple as that. I suggest in the first instance giving the money to people to allow them to live with those higher prices, but putting it in current dollars, so that eventually credit will become less and less valuable, and gradually phasing in a reduction in, say, the manufacturers' sales tax or the retail sales tax. If we are concerned, and I think rightly, about the price increase, a rather obvious way of offsetting it is to reduce other forms of taxes that are pushing prices up.

COMMENT: Doug Hartle's number of 50 per cent is probably closer to the number that one would want to end up with, even if one uses Professor Powrie's method of totalling up the taxes that would be levied if the oil industry were completely private with no provincial government involvement. I got that number by adding the additional personal taxes that would be paid on dividends received by individuals and also by taking account of the fact that one can also add into this calculation the kind of sales taxes that could be imposed were manufacturers' sales tax extended to petroleum. This is of course a numerical game, but I just want to point out that one can as easily rationalize 50 per cent using Professor Powrie's approach as one can rationalize 37 per cent. The basic question of course is one of negotiation and ending up with a mutually acceptable number.

More important, I would like to turn to the question of what the money received by the federal government in some manner, such as an excise tax or an agreement with the provinces, would be used for. I think there is a real conflict here between what might be desirable in the short run from a macro-stabilization point of view and what might be desirable in the long run from what we might think of as an industrial strategy point of view, or offsetting the allocative effects of the shift in real prices.

I think Doug Hartle is perfectly correct to say that in the short run the best thing to do with federal funds would be to allocate them back through something like a tax credit that would offset the effects of the increase in prices on incomes of consumers.

In the long run, however,the inflation partly caused by the movement to world oil prices combined with our tax system where taxable income at the corporate level is not indexed for inflation, means that effective tax rates are increased on industries other than the petroleum industry. Of course the petroleum industry benefits from the increase in prices. Thus in effect the long-run strategy to cause relative prices to be increased even more in industries other than petroleum is an implicit industrial strategy to use the tax system to bias the allocation of resources even further in the direction of petroleum and away from other manufacturing. I think that's a long-run problem. I therefore suggest that one ought to think of moving in the long-run to the uses of revenues from a federal excise tax or whatever to pay for additional investment incentives that offset the increases in the effective tax rates caused by the way in which inflation is not accounted for in our tax system.

COMMENT: Energy projects for the next seven years have already begun. The oil and gas we have already discovered are going to determine what we do in the next seven or years. So we should be looking further, at the decisions we have to make now to produce things ten years from now.

There I am disappointed that we haven't turned around and looked at conservation measures, or at what sort of fiscal policies we can apply to look into alternatives, to encourage innovation.

We are dealing with a future that is not going to look anything like the past. Thirty years ago we didn't have global corporations. Ten years ago we didn't have national oil companies. What are we going to have ten years from now? What are our cities going to be like in the next ten to fifteen years? Are we going to continue to design them to work against mass transit systems and low energy costs? If I insulate my house, it increases its market price, and therefore I am taxed more at a local level. These are the sort of things that I think we have got to look at. Policy decisions today are biased towards supply. What decisions are we making to bias some of those things towards conservation?

The current budget of the federal government towards conservation and renewable resources is about $25 million. If an oil company on the frontier drills a well costing $50 million, we given them search depletion, so they get tax writeoffs worth twice that amount. And that is only one well.

J. HELLIWELL: I think that is a splendid comment Mr. Waterhouse, and I stand corrected in the sense that the particular numbers I used and presented were simply to illustrate the policies discussed in the papers. It is quite true, if you look across the papers, that there is not nearly as much emphasis on the nuts and bolts of policies to rationally reallocate and make demand respond to scarce energy as there is on redistribution and taxation on the supply side. We are prisoners of the very system that has become too supply-oriented and not enough demand-oriented. I too have a feeling we are coming into a period of revolution in energy use in this country and in other countries, and I don't have much belief in our model for long-term forecasting of demand.

I entirely accept Doug Hartle's comment about uncertainty. But I wanted to invite people to rethink the basic assumptions of that link between energy use and GNP growth because even the most sophisticated of current price-responsive models show the big rise in energy prices causing demand to be flat about now, almost flat for ten or a dozen years, then to start growing again at the rate of GNP growth. My guess is when we really understand and use what will be the evolving technology in energy use, we will find ourselves with energy GNP coefficients that are trending down over the next twenty, thirty, fifty, sixty years. To think of the policies that at the moment stand in the way of people rationally responding in this almost inevitable direction I regard as one of the biggest challenges to those who analyse energy as well as to those who use it.

QUESTION: It should be understood that at least in the resource industries corporations do not pay taxes themselves. They merely act as conduits to bring those taxes from the consumer through to the various government levels. At the present time in Ontario natural gas consumers are probably paying approximately 40 per cent of their bills in the form of taxation, ostensibly to increase the price of energy to Ontario in order to have conservation.

The latest research in the natural gas industry would indicate that the recent tripling of natural gas prices at the retail level in Ontario has caused and is about to cause a 25 per cent minimum conservation factor in the use of natural gas in Ontario.

I would like to ask the panelists as we are looking at future energy prices what a reasonable conservation level is and what price the consumer, in Ontario or elsewhere in Canada, is going to have to pay. Consumers have been asked to conserve; they have conserved; how much more do they have to conserve and at what price?

T.L. POWRIE: I think that is a very important question. The answer I fall back on is straight from the principle of comparative advantage in international trade: how much we want to conserve of anything, how much we want to use of anything, depends on what it would cost to import it, or what we could earn by exporting it; that's the world price.

The question about the world price with respect to oil of course seems to be muddied by the fact that that price is not a natural price in some sense, it is cartel-set price. Another speaker however has already made the point that OPEC is part of our natural environment, like the trees and the sky and we must adapt to it. One possible exception to that point, one reason not to adapt to the OPEC price, would be if they put it up to a level that would soon collapse. There is no indication of them doing anything near that in the foreseeable future.

QUESTION: Regarding our development of alternative energy resources: will we find ourselves ten or fifteen years from now with a future pool of oil reserves which we will regret that we didn't use up along the way? Conservation may not necessarily be the right strategy now if, as one questioner mentioned, the alternative energy sources are coming on line.

JOHN HELLIWELL: It's important, Mr. Foot, to distinquish the light oils from the gas in this regard. There may well be a fairly large undeveloped stock of relatively low-cost gas in Canada. Nobody is suggesting that about oil.

What we are really thinking about is the whole 'soft energy' line, not only conservation its also a range of substitutes. But if you go through the time required for these things and look at the feasible rates of trying to get from a harder path to a softer path, you will see all involve using up the Canadian low-cost oil base. The only substitution concerns the high-cost frontier oil and gas. Even then we are probably not talking about the existence of them but about the scale of them, because if you follow the hard path forward as depicted in our model and others it gives some pretty frightening structures of the economy and what it will be doing in 2020 or 2030.

T.L. POWRIE: I'd like to raise a point about the equivalence of the scheme that I was proposing, federal taxation of provincial resources income on one hand, with non-deductibility for federal taxation of provincial royalties on the other. There is a substantial degree of equivalence between these two schemes, so to some degree my argument could be used as a rationale or justification for federal non-deductibility of provincial royalties in calculating federal taxes.

However the two are not totally equivalent. I think. Perhaps if one were to implement say, a very successful provincial royalty scheme that captured nearly 100 per cent of the royalties, then non-deductibility of those royalties would give the corporations in question a nasty jolt. They would be paying in costs and royalties and taxes, something like 125 per cent of their total revenue.

However there is a further move towards equivalence of the two schemes if one takes account of bonus bids or land sale prices. But there I will quit because I haven't figured it all out yet.

Energy and Equalization

T. J. Courchene

INTRODUCTION

With the recent resurgence in the upward spiralling of world energy prices Canada now finds itself with a domestic energy price that is more than $10 a barrel below the world level. Moreover, given a world price in terms of Canadian dollars of slightly over $25 a barrel and a reasonable expectation that this world price will escalate in line with general inflation rates, this implies that the typical $2 a barrel a year increase in domestic prices will likely result in a widening gap between the Canadian and world prices for energy. Hence pressures are intensifying for more rapid domestic price increases, and the battle lines between the producing and consuming provinces are quickly being drawn.

There are, in principle, three separate issues in this controversy. The first relates to allocative efficiency. At what level should we price domestic energy? Here the edge would seem to go towards moving the Canadian price to world levels, at least for oil. This would curtail demand for energy, increase the supply of oil and gas, and in general enhance our ability now and in future of satisfying domestically our over-all energy requirements. The second issue relates to distributional equity and is perhaps the most delicate. Who should get the energy rents? A move to world prices would increase energy revenues by some $10 billion (assuming current consumption levels). How much of this should go to the industry, how much to government (and which governments), and how much should be returned to consuming Canadians? Finally, there is the stabilization issue. What effect will rising energy prices have on income, employment,

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It is a pleasure to acknowledge the helpful insights and assistance of Glen Copplestone in preparing this paper. I would also like to thank members of the Departments of Finance and Energy Mines and Resources for helping me through the data complexities of equalization and energy. Responsibility for the views expressed rests entirely with me.

inflation, regional disparities, and so on? While separable in principle,these issues in practice tend to be intricately interwoven, contributing to the inherent complexity of the current energy debate in Canada.

As if the energy question in Canada were not sufficiently intractable of its own accord, yet another consideration further complicates the policy discussion: equalization payments. This paper focuses on the interaction between equalization payments and energy. Ideally, one would like to be able to take energy policy as a 'given' for purposes of evaluating its impact on the system of equalization payments. Reality is different, however. Furthermore, equalization payments have in the recent past had a major influence on energy policy, so that influences flow in both directions. It is therefore not feasible to conduct an analysis of the role and magnitude of equalization payments without occasionally venturing into the domain of the allocative, distributive, and stabilization implications of alternative energy policy scenarios. As much as possible, however, I shall respect the confines of this paper and avoid commenting on these larger issues.

To provide some perspective on the role of equalization payments in the current policy debate it is necessary to present background information both on the operations of the equalization payments system itself and on its interaction with the energy sector over the recent past. This is the subject of the second and third sections of the paper. The fourth section reviews the changes in the equalization formula that followed the quadrupling of energy prices in 1973-4. Attention will be directed to the amendments in 1974 as well as to those in the 1977 Fiscal Arrangements Act and, more recently, those incorporated in Bill C-26. The fifth section presents a historical perspective on the role that energy royalties have played in generating increases in equalization payments. The analysis then turns to the very sensitive issue of whether or not there is an inequity in the manner in which the equalization program is funded. An energy 'balance sheet' is constructed for equalization payments. The conclusion of this section is that the energy-producing provinces are not funding their fair share of energy-related equalization payments. The seventh section applies this balance-sheet approach to the impact of a $1 a barrel increase in the price of domestic energy, placing in stark relief the implications of rising domestic energy prices; the discussion concerns the equalization aspects rather than the more global issue of who ought to receive the massive energy rents. The eighth section focuses on the implications of the analysis for several issues relating to equalization payments. Chief among these are how large equalization payments should be and how they should be funded. A short conclusion completes the paper.

EQUALIZATION PAYMENTS: THE CURRENT SYSTEM

Equalization payments are designed to ensure that all provinces are able to provide 'reasonably comparable levels of public services without resorting to unduly high levels of taxation.'[1] However, there exists no definition of what might constitute 'reasonably comparable levels of public services' or 'unduly high levels of taxation.' No attempt is even made to define these concepts. Rather, the program has concentrated on provincial revenues: until recently equalization payments were designed to ensure that no province had access to less than the all-province average of per capita revenues.

The program currently works as follows. Revenues are equalized over twenty-nine revenues sources (e.g. personal income taxes, corporate income taxes, sales taxes, six revenues sources relating to oil and gas). A list of these revenue categories appears in Table 1. For each of these revenue sources a uniform tax base, representative of provincial taxing practices, is calculated.[2] A province is eligible for an equalization payment (i.e. is a 'poor' province in equalization jargon) for a given revenue source if its share of the total tax base is less than its share of total population. The value of the equalization payment for a particular revenue source equals this percentage shortfall (normally referred to as the 'fiscal deficiency') multiplied by total provincial revenues from this revenue source.[3] A rich province is one whose share of the tax base in question exceeds its population share; its equalization entitlement for this tax source

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[1] Donald S. Macdonald, 'Review and Reform: Fiscal Arrangements into the 1980s,' Department of Finance Released 76-33, Ottawa, 1 April 1976, 5. Virtually the same definition of the role of equalization payments was enunciated ten years earlier by the then Finance Minister Mitchell Sharp in connection with the 1967 review of equalization payments.

[2] These tax bases are calculated for each province, whether or not the province utilizes the tax base. For example, Alberta has no sales tax, but its tax base for retail sales is calculated in the same manner as that for other provinces.

[3] The value of total revenues for each revenue source appears as column 1 of Table 5. Note that for the six energy revenue sources (numbers 16 through 21) only half of total revenues are eligible for equalization. This exception to the principle of equalizing total revenues will be dealt with below.

TABLE 1

Revenue categories and associated equalizations: 1979-80

		Revenues eligible for equalization ($ million) (1)	Equalization entitlements for seven receiving provinces ($ million) (2)	Average equalization per dollar equalization (cents) (3)
1	Personal income tax	10,373	768	7
2	Business income revenues	2,774	370	13
3	General sales tax	5,620	340	6
4	Tobacco taxes	715	-3	-4
5	Gasoline taxes	1,458	32	2
6	Diesel fuel taxes	297	7	2
7	Non-Comm. vehicle licences	595	10	2
8	Commercial vehicle licences	522	35	7
9	Alcohol revenues: spirits	899	77	9
10	Alcohol revenues: wine	232	9	4
11	Alcohol revenues: beer	333	-3	-1
12	Health insurance premiums	1,283	39	3
13	Succession/death taxes	77	7	9
14	Race track revenues	105	16	15
15	Forestry revenues	325	59	18
16	Crown Oil revenues	1,144	379	33
17	Freehold poil revenues	63	16	25
18	Crown gas revenues	737	317	43
19	Freehold gas revenues	32	14	44
20	Sales of crown leases	373	147	39
21	Other oil and gas revenues	46	17	37
22	Mineral revenues	152	-9	-6
23	Water power rentals	55	-11	-20
24	Insurance premium taxes	223	2	1
25	Payroll taxes	505	32	6
26	Property and school taxes	3,859	208	5
27	Lottery revenues	212	10	5
28	Miscellaneous prov. taxes	1,755	122	7
29	Shared federal revenues	16	0.2	1
	Total	34,780	3007	9

NOTE: In rows 16 -21 the revenues to be equalized represent 50 per cent of total provincial revenues for these sources. Under Bill C-26 only one-quarter of revenues for sales of crown leases (row 20) would enter the formula in 1979-80; however, one-half has been entered, since Bill C-26 did not become law.

Column 3 is column 2 divided by column 1. Negative entries in columns 2 and 3 imply that on average the seven recipient provinces are 'rich' for the revenue category in question. Therefore the entitlements are negative and serve to decrease over-all equalization flows.

SOURCE: Provincial Fiscal Equalization Tables: Second Estimate, 1979/80 (Ottawa: Department of Finance, 1979) various tables.

would be negative. An example may be in order. Suppose Province A has 5 per cent of Canada's population and Province B has 10 per cent. Suppose further that they both have 8 per cent of a particular tax base for which total provincial revenues equal $1 billion. Province A, with a fiscal excess of 3 per cent, would have a negative equalization entitlement of $30 million (i.e., 3 per cent of $1 billion), while Province B would have a positive equalization entitlement of $20 million for this revenue source.[4]

For each province these entitlements are summed over the twenty-nine revenue sources, and the total, if positive, equals the province's equalization payment. If the aggregated total is negative, the province is classified as a 'rich' or a 'have' province, and its entitlement is set at zero. Note that this implies that the system is not an interprovincial revenue-sharing program. Provinces do not contribute money directly towards equalization payments; instead, payments are financed out of Ottawa's general revenues. The significance of the funding provisions will become apparent later. Row 1 of Table 2 presents the most recent estimate of the equalization entitlements for fiscal year 1979-80. Only two provinces qualify as 'rich' or 'have' provinces - Alberta and British Columbia - with negative equalization entitlements of roughly $2½ billion and $½ billion respectively. Hence their equalization payments are set equal to zero; they do not contribute these negative entitlements towards the financing of the fund. What is probably very surprising to a good many Canadians is that Ontario now qualifies as a have-not province (as it has done for the two previous fiscal years) with a positive entitlement of $172 million. As will be pointed out below, Ontario is not likely to be eligible to receive equalization payments, despite its positive entitlement.[5] Hence the $172 million is not included in the $3007 million total in the last column. Quebec gets just over half the total dollar value of equalization payments, although

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[4] For a demonstration that this is essentially equivalent to generating access for each province to revenues equal to the product of average per capita tax rates and average per capita tax bases, see T.J. Courchene and D.A. Beavis, 'Federal provincial tax equalization: an evaluation,' Canadian Journal of Economics 6 (1973) 487.

[5] To anticipate the following analysis somewhat, Bill C-26 introduced in the last Parliament precluded a province from receiving equalization payments if its per capita income exceeded the all-province average. This bill did not become law, however, so the question of Ontario's receiving equalization payments remains in limbo. For much of the analysis, we shall assume that this bill will be resurrected, though I argue that Ontario should be entitled to receive equalization payments.

TABLE 2

Energy and equalization: selected data for fiscal year 1979-80.

	NFLD	PEI	NS	NB	QUE	ONT	MAN	SASK	ALTA	BC	TOTAL
1) Equalization entitlements, 1979-80 ($ million)	338	77	410	352	1,522	172	266	41	-2596	-583	3007[a]
2) Equalization entitlements ($ per capita)	589	626	484	502	241	202	258	42	-1293	-227	-
3) Total per capita provincial revenues (1978-9) ($)[b]	2054	2179	1739	1864	2220	1646	1693	2098	3303	2019	-
4) Equalization as % of total revenue	29	29	28	27	11	0[c]	15	2	0	0	-
5) Equalization entitlements arising from energy ($million)	58	13	86	71	639	860[d]	100	-77	-	-	889[e]
6) Energy entitlement as % of total equalization entitlements (row ÷ row 1)	17	17	21	20	42	500[d]	38	-187	-	-	30

SOURCE: Provincial Fiscal Equalization Tables: Second Estimate 1979/80 (Ottawa: Department of Finance, 1979). The final estimates, based on complete data for 1979-80, will not be available until 1981. The equalization entitlements are somewhat larger than those shown in the Department of Finance estimates because the latter incorporates the phasing out of the 'sale of crown leases' revenue category under the provisions of the now defunct Bill C-26. I have treated revenues from crown leases like all other energy revenues, i.e. one-half revenues are eligible for equalization.

a) The $3007 million total for equalization payments does not include Ontario's $172 million entitlement because, for reasons cited in the text below, it is not likely to receive these monies.

b) Values for total provincial revenues are from Table 1 of Provincial Government Finance: Revenue and Expenditure Estimates: 1978 (Statistics Canada Catalogue No. 68-205).

c) Set equal to zero because of the likelihood that Ontario will not be allowed to receive its equalization entitlement.

d) Ontario has huge positive entitlements from energy. However, because the remaining revenue categories generate entitlements (i.e. over-all, Ontario is a rich province for these other categories) its total entitlement is much less than its energy entitlement, i.e. $172 million from row 1.

e) This total is the sum of the energy entitlements from the seven receiving provinces, i.e. it excludes Alberta, BC, and Ontario. Note that it does include the negative entitlement for Saskatchewan (i.e., although Saskatchewan is 'rich' for the energy categories, over-all it is, still a have-not province for equalization payments).

in per capita terms its share is $241, compared to, say, $626 for Prince Edward Island. These per capita figures appear as row 2 of Table 2. Equalization payments are a very significant source of revenue to many provinces, just how significant is evident from rows 3 and 4 of Table 2. Row 3 presents data on total per capita revenues from all sources (including equalization payments) for the fiscal year ending in March 1979. Row 4 expresses equalization payments as a proportion of these total revenues.[6] For each of the Atlantic provinces equalization payments account for over 25 per cent of total provincial revenues.

The per capita provincial revenues in row 3 are worthy of further scrutiny. Once again, it will come as a surprise to many Canadians to observe that Ontario has the lowest per capita revenues of all the provinces - $1646. These revenue figures reflect relative provincial wealth and relative tax rates as well as transfers of various sorts from Ottawa. To be sure, Ontario's per capita revenues would be higher if this province had personal income tax rates as high as some of the other Canadian provinces. By the same token, Alberta's $3303 per capita underestimates significantly the revenues she would have at national average tax rates. For example, Ontario gets over $200 a person from sales taxes, while Alberta has no sales tax. More interesting, and more relevant for this Conference, Alberta's current per capita revenues from oil and gas exceed the total of Ontario's per capita revenue from all sources. And the potential for these energy revenues to increase dramatically is evident when one considers that the domestic price is over $10 below the world price.

INTERACTION BETWEEN ENERGY AND EQUALIZATION

The subject of this paper is not equalization payments themselves but rather the interaction between energy prices and equalization payments.[7] With the brief outline of the system as a backdrop we may now see how the energy crisis has affected equalization payments and, just as important in some instances, how the equalization system has constrained energy policy.

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[6] These ratios would be slightly on the high side since we are expressing 1979-80 equalization payments as percentages of 1978-79 total revenues. For example, the figure for Newfoundland would be 27% rather than 29%

[7] The reader interested in pursuing more on the topic of equalization payments can consult Courchene and Beavis (see note 4) or Thomas J. Courchene, Refinancing the Canadian Federation: A Survey of the 1977 Fiscal Arrangements Act (Montreal: C.D. Howe Research Institute, 1979).

Six categories relating to oil and natural gas revenues enter the equalization formula. These are crown oil revenues, freehold oil revenues, crown gas revenues, freehold gas revenues, revenues from sales of crown leases, and miscellaneous oil and gas revenues. In the latest Finance Department estimate[8] of equalization payments for 1979-80, energy revenues for the producing provinces amount to $4.75 billion, of which roughly $4 billion accrues to Alberta. These figures appear as row B.2 of Table 4. In line with the recent revisions to the energy side of the equalization formula (to be dealt with below), half of this amount, or just under $2½ billion is eligible for equalization. The amounts, by revenue source, of energy monies eligible to enter the formula appear in Table 1 rows 16 through 21. In comparison to, say, the retail sales tax category (where $5.6 billion is equalized) or the personal income tax category (where over $10 billion is equalized) the energy dollars eligible for equalization are not particularly large (see Table 5). Yet the equalization payments resulting from energy are far and away the largest. For example, each dollar increase in provincial income tax revenues generates an average of 7¢ in equalization payments, while each corporate income tax dollar results in a 13¢ increase in equalization payments. Compare this with each extra dollar of energy revenue that enters the formula which adds on average 40¢ to equalization payments. Data on the amounts that are eligible for equalization by revenue category and the resulting equalization generated also appear in Table 1.

Why is this so? Very simply because the energy revenues are concentrated in the three westernmost provinces. Therefore, most of the seven traditional recipient provinces (Saskatchewan is an exception) have a zero tax base for the energy revenue categories. And with a zero tax base, provinces become eligible for their population share of energy revenues.[9] In effect, then, equalization payments arising from energy essentially amount to a per capita grant for provinces that qualify for equalization. With about $2.4 billion of energy revenues eligible for equalization and with a national population of just under 24 million, the per capita value of this energy grant approximates $100. Therefore, Quebec, with just over 6.3 million people, gets just over $630 million in equalization payments from oil.[10]

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[8] June 1979 (see notes to Table 1). The figures that follow in the text do not take account of the 1 July 1979 hike in domestic energy prices.

[9] Recall that, for each revenue category equalization is a product of the province's fiscal deficiency and total provincial revenues. The fiscal deficiency equals a province's population share minus its tax base share, so that a zero tax base means that its population share is identical to its fiscal deficiency.

These provincial energy entitlements appear as row 5 of Table 2. The $889 million total is the sum of entitlements of the seven traditional have-not provinces (i.e. all provinces except BC, Alberta, and Ontario). The entitlement for Saskatchewan is negative, implying that for energy this province is classified as rich. Indeed, as energy prices continue to rise this province will soon enter the have category.

Ontario's position is particularly intriguing. Its energy entitlement is now $860 million. The growth of this entitlement as the price of energy has risen has finally pushed Ontario into the have-not category; i.e. the $860 million positive entitlement for energy is now larger than its total negative entitlements for the remaining revenue sources, so that Ontario now has a $172 net entitlement (row 1).[11]

Row 6 of Table 2 shows the percentage of total equalization, by province, accounted for by the six energy categories. Energy now accounts for 30 per cent of total equalization payments (once again the total excludes Ontario, BC and Alberta), although for the Atlantic region the percentages are considerably lower. Later sections of the paper make further reference to these percentages.

ENERGY-RELATED MODIFICATIONS TO THE EQUALIZATION FORMULA

Reaction to the price rises in 1973 and 1974

With the advent of the unexpected and massive increase in the price of oil beginning in late 1973, one of Ottawa's first actions was to impose an export tax on oil shipments equal to the difference between the then-fixed domestic price and the rising world price. In effect, Ottawa garnered the entire rent arising from the world/domestic price differential, which amounted to over $6 a barrel by mid-1974. No doubt part of the rationale for this measure was to generate funds for the federal government to subsidize foreign oil imports in eastern Canada, thereby maintaining a uniform price for energy across the country. Unlike the current situation, taxable exports of crude oil in 1974 exceeded compensatable oil imports, so that on balance Ottawa was a net financial beneficiary of this action.

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[10] Alternatively, Quebec, with a zero oil base and 26.7 per cent of Canada's population, obtains 26.7 per cent of the $2.4 billion of formula-eligible energy revenues, or $639 million. This figure appears in row 5 of Table 2.

[11] There are other reasons for Ontario's fall into the have-not category. Some of its other revenue sources have undergone serious deterioration relative to the Canadian average. For example, in 1972-3 Ontario's share of the corporate income tax base was 45.24%. By 1979-80 (i.e. for 1979-80 equalizations computations) it had fallen to 37.06%, barely above its 36.01% population share. In part, this too is due to energy prices and the resulting rise of corporate activity in this industry. Comparable figures for Alberta (with a population share of 8.5%) indicate a 9.4% of the base in 1972-3 with an increase to 19.53% in 1979-80.

The producing provinces reacted quickly and increased substantially the royalties they were exacting from both oil and natural gas. Ottawa responded by disallowing the deduction of royalty payments to provincial governments for purposes of corporate income tax calculations. As I have argued elsewhere,[12] one rationale for this Ottawa initiative had to do with the implications for the system of equalization payments. If the domestic price were allowed to rise and the producing provinces allowed to pocket the increased royalties, the result would have been a very substantial rise in equalization payments. If, in addition, royalties paid to the provinces were deductible for corporate income tax purposes, Ottawa might find that its equalization responsibilities had increased substantially while its revenues had not increased commensurately; in particular, it would not be able to exact much revenue from the very provinces that were becoming wealthy and thereby causing the equalization payments to increase.

Of course, there were other considerations to be taken into account. Allocative efficiency dictated a rising domestic oil price, and in the scramble over who would get the rents some consideration had to be given to ensuring future energy supplies, and this required an incentive for exploration. A compromise was reached whereby Ottawa maintained the non-deductibility of royalties but introduced (overly?) generous writeoffs for exploration and development and also allowed the domestic price of oil to move gradually towards world price levels.

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[12] Thomas J. Courchene, 'Equalization Payments and Energy Royalties' in Anthony Scott ed., Natural Resources Revenues: A Test of Federalism, British Columbia Institute for Economic Development (Vancouver: UBC Press, 1976) 73-107.

But the equalization dilemma remained. If Canada went to world oil prices in 1974, total equalization payments would have tripled, and in the process Ontario would have become a have-not province. Therefore, in the fall of 1974 Ottawa unilaterally amended the equalization formula. Energy royalties up to the 1973-4 levels would continue to be eligible for full equalization (i.e. each dollar of energy would continue to enter the formula as had been the case since the 1967 revision). But revenues from energy above the 1973-4 level would be equalized only to the extent of one-third; one dollar of every three would be eligible to enter the formula.

This was a major alteration in the formula. For the first time since 1967 the concept of 'full equalization' had been abandoned to the degree implied by the one-third measure. By continuing to subsidize imports for the eastern provinces (i.e. Quebec and the four Atlantic provinces) in order to maintain a uniform domestic price, Ottawa could be viewed as 'equalizing' oil for these provinces, all of whom fall in the have-not category. Some figures on the benefits by provinces of this oil import compensation scheme will be presented later.

The 1977 fiscal arrangement act

The next instalment in the interaction between energy policy and equalization payments came with the 1977 Fiscal Arrangements Act, a major revamping of the financial underpinnings of confederation. Changes were made in the financing of the conditional grant programs and the revenue guarantee as well as the equalization program. Even for the latter the new provisions extended well beyond energy matters, but these need not detail us here.[13]

For our purposes, two provisions are important. First, henceforth half of all energy royalties would be eligible for equalization. This replaced the previous provision whereby the full amount of 1973-4 revenues was eligible plus one-third of any additional revenues. One slight change was that the one-half provision applied to all non-renewable resources and not only to energy revenues (i.e. it applied to the six revenue categories for oil and natural gas as well as to the revenues from 'metallic and non-metallic minerals,' category 22 in Table 1). For fiscal year 1976-7 both the old and new approaches to energy yielded approximately the same amount of revenues for the formula. But beyond 1976-7 the new provision was far more generous: one-half rather than one-third of additional energy revenues would be eligible to enter the formula. This approach to equalizing energy revenues was rather surprising since Ottawa's initial position during the negotiations leading up to the new fiscal arrangements was that equalization payments were growing too rapidly. In any event this provision essentially preordained on one hand that equalization payments would continue to rise rapidly as energy prices rose and on the other that it would only be a matter of time before Ontario became a have-not province.

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[13] For a survey of these changes, see Courchene, (note 7 above).

The second energy-related provision in the 1977 Act limited the proportion of total equalization arising from resource revenues of all kinds (renewable as well as non-renewable)[14] to one-third. This essentially put a cap on the degree to which equalization payments could be spiralled upwards by energy royalties. However, the manner in which this one-third limit was to be applied was unclear. The most straightforward interpretation, and the one that Ottawa probably chose initially, would be to take the ratio of the resource equalization entitlements for the recipient provinces to the total amount of equalization payments. From Table 2, this is roughly the ratio that appears in the last column of row 6, i.e. 30 per cent.[15] The problem with this measure is that as soon as Ontario qualified as a have-not province (and it qualified in the initial year of the new arrangements, although that was not recognized until early in 1979 when the final estimates for 1977-8 were completed) the ratio would increase to somewhere in the neighbourhood of 60 per cent. This is so because once Ontario is eligible to receive one dollar in equalization payments, its energy entitlement of $860 million (row 5 of Table 2) is added into the numerator for calculating the ratio. This method of applying the one-third limit would effectively mean that Ontario could never receive equalization payments. It also implied that the precise one-third ratio might never be reached; the ratio might simply alternate between say 30 per cent and 60 per cent, with percentages between being unattainable.

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[14] Resource revenues comprise revenue categories 15 through 23 of the appendix table.

[15] This is somewhat of an underestimate because it does not include the entitlements from renewable resources nor from minerals (i.e., revenue categories 15, 22, and 23, Appendix Table 1). Inclusion of these revenues yields a ratio for 1979/80 of 30.9%.

In order to sidestep these problems Ottawa finally decided that, for purposes of calculating the one-third ratio only, the resource entitlements of the seven 'traditional' have-not provinces would be counted. Thus even if Saskatchewan fell into the have category and Ontario became a have-not province the resource entitlements of the former but not those of the latter would enter the calculations of the resource limit. Since Saskatchewan's resource entitlement is negative, this increased the amount of energy revenues that can enter the equalization formula before it hits the ceiling. Even so, the poor provinces and particularly the Atlantic provinces are not likely to be too excited by this interpretation of the one-third limit. From Table 2 it is clear that, even without Ontario, the system is currently very close to the one-third limit. Yet this is not the case for the Atlantic provinces (see the last row of Table 2).

Scarcely one year into the new arrangements it became clear that Ontario would be headed for the have-not category. And with this interpretation of the one-third limit nothing prevented Ontario from receiving equalization payments. This did not sit very well with Ottawa, and the federal response was embodied in Bill C-26.

Bill C-26

Introduced in December 1978, Bill C-26 was designed to accomplish two related goals: to reduce the total level of equalization payments and to prevent Ontario from receiving an equalization payment. The provision relating to the latter was straightforward: any province whose per capita income was above the national average in the current year as well as in the previous two years would be ineligible for an equalization payment. Since Ontario falls into this category it would not be eligible for equalization even if its total entitlement became positive. Moreover, this provision was to apply retroactively to the introduction of the 1977 Fiscal Arrangements Act, so that Ontario would not be eligible for payments in fiscal years 1977-8 and 1978-9, even though recent calculations reveal that it qualified as a have-not province for these years as well.

Although this initiative reduced over-all equalization transfers, the second provision of Bill C-26 was even more specific in the direction of curtailing payments. The 'Sale of Crown Leases' revenue source (category 20 in Table 1) was to be phased out of the equalization formula. According to the 1979-80 estimates, this revenue source generated $746 million in revenues, of which $373 million was eligible to enter the formula and generated $147 million in equalization payments. It is true that revenues from sales of crown leases had spiralled dramatically (they had been only $100 million in 1975-6), but this unilateral action by Ottawa only eighteen months after the 1977 Fiscal Arrangements Act came into effect demonstrated the increasing arbitrariness associated with federal-provincial financial relations and in particular the continuing influence of energy revenues on the operations of the equalization program. This initiative was motivated in part by the restraint program ushered in by Prime Minister Trudeau in August 1978. But all of this is academic since Bill C-26 died on the order paper with the dissolution of Parliament.

ENERGY AND EQUALIZATION: A HISTORICAL PERSPECTIVE

Despite these various energy-related amendments of, and modifications to, the equalization program, nonetheless much of the recent growth in equalization payments has been due to the rise in energy royalties. Table 3 shows this growth, utilizing fiscal year 1972-3 (i.e. prior to the initial energy price explosion) as the benchmark. Payments have increased by just under $2 billion, from $1016 million in 1972-3 to $3007 million in 1978-9. In absolute terms the non-energy revenue sources accounted for most of this increase. In percentage terms, however, energy-related equalization payments increased by 517 per cent, as compared to 143 per cent for the remainder. In 1972-3 energy sources accounted for 14 per cent of total payments in 1972-3, and this percentage has now risen to 30 per cent.

One way to evaluate the impact on equalization payments of some of the recent modifications is to calculate what equalization would have been in the absence of these provisions. If there were no one-third limit on resource revenues and if all resource revenues entered the formula in full (rather than at the current 50 per cent level), equalization payments for 1979-80 would amount to $4964, rather than the present $3007 million. At the more detailed level (not presented in the Table) Ontario's positive equalization payment would be $1032 million, while Alberta's negative entitlement would equal $4389 million. Compared to fiscal year 1972-3, when Ontario's negative entitlements were far in excess of Alberta's ($514 million as against $332 million),[16] this increase clearly demonstrates the

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[16] From Table 10-2 of The National Finance: 1972-73 (Toronto: The Canadian Tax Foundation, 1972).

TABLE 3

Energy and equalization: a historical perspective ($ million)

		Total equalization payments	Portion arising from energy	Portion arising from non-energy sources
	Panel A: 1972-3 and 1979-80 compared			
1.	Fiscal year 1972-3 ($million)	1016	144	872
2.	Fiscal year 1978-9 ($million)	3007	889	2118
3.	Increase			
	$ (million)	1991	745	1246
	%	196	517	143
4.	Allocation (%)			
	1972-3	100	14	86
	1979-80	100	30	70
	Panel B: 1979-80 equalization payments if there had been no modifications to the equalization formula[a]			
5.	Level ($million)	4964	3652[b]	1312[b]
	Increase over 1979-80	1957	2763[b]	-806[b]

a) Adopted from Thomas J. Courchene and Glen H. Copplestone, 'Alternative equalization programs: two-tier systems,' paper prepared for a Canadian Tax Foundation Conference (forthcoming).

b) These numbers may appear surprising. They arise because at 'full' equalization Ontario becomes a have-not province while Saskatchewan joins the ranks of the 'rich' provinces. For example, from Table 1, the total equalization entitlements currently arising from personal income tax are $768 million. In Panel B the corresponding (not shown) total is only $229, because Ontario's negative entitlement (it is a rich province for personal income tax) now draws down the level of equalization attributable to this revenue category.

dramatic impact that energy has already had on interprovincial finances. And with the domestic oil price at $13.75 a barrel, Canada is barely halfway to the current world price of over $25 a barrel[1].

FUNDING EQUALIZATION PAYMENTS

The equalization system is a federal program, funded from federal revenue sources. Taxpayers in like circumstances contribute the same amount towards the program's funding regardless of their province of residence. It would appear, therefore, that there would be no reason to question the equity aspects of funding equalization payments.

However, I think the funding of the program leaves a lot to be desired. The potential equity concern arises because Ottawa has undertaken to equalize some revenue sources that are under provincial rather than federal control. For certain taxes, like retail sales taxes, this poses no real problem since I imagine the distribution of retail sales across the country does not differ very much from the incidence of Ottawa's indirect tax collections. For other revenue sources concerns do arise because they are so concentrated geographically and yield so much revenue. The combination of these two factors generates large equalization flows. Yet the provinces on the receiving end of these revenues make no direct contribution to funding the equalization flows that these revenues generate.

An equalization 'balance sheet'

Table 4 presents an extreme form of equalization balance sheet as it applies to energy. As background to the balance sheet proper, Panel A contains a rough and ready estimate of the provincial distribution of Ottawa's general revenue. Population shares, included for comparison only, appear in row A.2. Thus Ontario, with 36 per cent of Canada's population accounts for roughly 39 per cent of Ottawa's revenue; Alberta's residents account for 12 per cent of total federal revenues while accounting for only 8½ per cent of Canada's population; and so on. Utilization of the percentages in row A.1 to allocate the costs of the program implies that there exist no special federal levies or taxes specifically earmarked to pay for the equalization program.

Panel B of Table 4 presents the energy balance sheet. Row B.1 contains the producing provinces' revenues arising from the six oil and

TABLE 4

Selected aspects of funding equalizations: 1979-80

	NFLD	PEI	NS	NB	QUE	ONT	MAN	SASK	ALTA	BC	Total
Panel A: Federal revenue and population allocations											
A.1 % of Federal revenue[a)]	1.38	0.28	2.40	1.90	23.40	38.87	3.60	3.37	12.01	12.79	100
A.2 % of Population	2.43	0.52	3.59	2.97	26.69	36.02	4.36	4.05	8.50	10.88	100
Panel B:											
B.1 Production Revenues accruing to provinces ($ million)[b]	0	0	0	0	0	1	11	352	4091	331	4786
B.2 Equalization Payments arising from oil ($ million)	58	13	86	71	639	0[c]	100	-77	0	0	889
B.3 Provincial source of equalization payments ($ million)	12	2.5	21	17	208	346	32	30	107	114	889
B.4 'Net balance'[d]											
($ million)	46	10.5	65	54	431	-345	79	245	3884	217	
($/capita)	80	85	77[b]	77	68	- 41	77	256	1935	85	

NOTE: As pointed out in the text, this table presents a very extreme view of who 'pays' for equalization arising from energy. Please consult the text for alternative approaches to viewing the funding issue.

a) These shares were calculated as follows. Ottawa's tax revenues come principally from three sources. Personal income taxes, corporate income taxes, and indirect taxes. I made the simplifying assumption that all of Ottawa's revenues come from these three sources. Next I allocated provincial shares of these taxes according to the tax base shares (derived from the equalization tables) for personal income taxes, busines income taxes, and general sales taxes respectively. The provincial shares in row 1 are the result of applying weights (summing to unity and based on the share of federal revenue) and summing the three provincial revenue categories.

b) Adapted from Provincial Fiscal Equalization Tables: Second Estimate, 1979/80.

c) Ontario is assumed to be ineligible to receive equalization payments.

d) Row B.4 is plus B.2 minus B.3.

natural gas categories (categories 16 through 21 of Table 1).[17] Of the $4.75 billion total, fully $4 billion, or 80 per cent, accrues to Alberta.[18] Row B.2 shows the equalization flows generated by the revenues in row B.1. These flows are identical to those in row 5 of Table 2, except that Ontario's figure has been set at zero to reflect the fact that in the current Canadian context this province is not likely to be able to receive an equalization entitlement. The $889 million total is then allocated by province in accordance with the percentages that appear in row A.1, and these provincial funding contributions appear as row B.3.

The final rows of Panel B contains the 'net balance'-production revenues plus equalization payments minus contributions to funding equalization. Ontario is the only province with a negative figure (-$345 million), while Alberta has a positive total of just under $4 billion. Saskatchewan's position is more intriguing. It gains $352 million from the production side, but its equalization payments fall by $77 million, and its residents contribute $30 million to financing the program.

Interestingly enough, in dollar terms Quebec ends up with considerably more money than do two of the producing provinces. Quebec's equalization payments from these energy sources amount to $639 million, whereas the production revenues from BC and Saskatchewan amount to only $331 million and $352 million. This holds true even after the funding of the program is taken into consideration: Quebec's net balance is $431 million compared with $245 million and $217 million for Saskatchewan and BC respectively. In per capita terms, however, this no longer holds.

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[17] There are of course other revenues arising from energy, e.g., corporate income taxes derived from oil and gas companies. These are excluded from the Panel B calculations. To be sure, provincial corporate income taxes from the energy industry do generate equalization payments. But Ottawa shares in these tax revenues and, more important, derives the revenues from the very provinces whose increased revenues are causing the rising payment flows. Note that excluded from this balance sheet exercises are the revenues that accrue to the energy industry as well as those that accrue to Ottawa. Historically, Ottawa has obtained about 10% of total revenues, with the remainder being split roughly equally between the industry and the producing provinces.

[18] Since these revenues come from foreign as well as domestic sales of oil, gas, and exploration rights, a 'full' balance sheet would allocate the source of these revenues across provinces. Panel B does not attempt this exercise. However, Table 5 provides such a breakdown in connection with the impact of a $1 per barrel rise in the price of domestic oil and gas.

Quebec's net balance is $68, compared to $85 for BC and $256 for Saskatchewan. Ontario has a 'deficit' of $41 per person, compared with a $1935 'surplus' for Alberta. One anomaly still remains: Prince Edward Island comes off as well as BC in the per capita net balance.

Even recognizing the questionable nature of this exercise, the conclusion I draw is that there is indeed an inequity in the funding of the equalization program, and the producing provinces should be called upon to play a greater role in funding the program. More on this later.

Problems with the balance sheet approach

Elsewhere I have been taken to task for presenting a very similar balance sheet exercise.[19] Basically the concern is that it is inappropriate to dissect federal policies in terms of who 'gains' and who 'loses.' My response is simply that I feel that it is appropriate. This is especially so for the energy portion of equalization since Ottawa is involved in equalizing not only somebody else's revenues but as well a set of revenue sources in which it does not reap many returns.

But how true is it that Ottawa does not really obtain a share of these energy rents? What are Ottawa's revenue sources from oil and gas? Among the most important (with guesses at their magnitude) are the following:

Excise tax on motor and aviation fuel. This tax is now set at 7 cents a gallon. Last fiscal year (with a tax rate of 10 cents and excluding aviation fuel) this tax generated about $800 million in revenue, with rebates amounting to $300 million, for a net gain in the order of $500 million. This year it should be less, say $400 million.

Manufacturers sales tax. This is currently set at 9 per cent, but for gas and oil it is converted into a specific tax per gallon of gasoline (in the neighbourhood of 5 cents). My estimate is about $500 million.

Corporate income taxes. Historically Ottawa has gained about 10 per cent of the total revenue accruing to the oil and gas industry (with the rest split roughly equally between the producing provinces and the industry itself). Presumably most of this is in the form of corporation taxes. Offsetting this is the fact that some of the federal corporate tax is used to pay for equalization arising out of the provincial component. More important, via generous exploration, development and depletion provisions Ottawa has provided substantial funds to corporations which to a very large degree are later captured as royalty rents by the provinces or capitalized in the sale of crown leases,[20] for example. While it is impossible to be specific about the net yield of the corporate tax, one can provide a range of figures. If there were no incremental exploration on the part of the industry in the face of increased energy revenues, the federal government would get 27 per cent of the total revenues, the producing provinces 48.4 per cent, and the industry 24.6 per cent. However, with additional exploration amounting to 50 cents on each dollar of revenue increase, the industry share would rise to 53 per cent, while Ottawa's share would plummet to 3 per cent, with the producing province's share falling slightly to 44 per cent (reflecting their share of the over-all fall in corporation income taxes).[21] Thus Ottawa's share of any increased energy revenues varies inversely with the level of exploration (although this represents tax deferral rather than an outright tax loss). And as noted above some of the federal tax loss is a direct transfer to the provinces because the generous writeoffs become capitalized in the industry bids for the sale of crown leases, etc. Thus the over-all impact is uncertain.

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[19] See Thomas J. Courchene, 'The new fiscal arrangements and the economics of federalism,' and Richard Bird, 'Report on the Courchene workshop,' in Options: Proceedings of the Conference on the Future of the Canadian Federation (Toronto: University of Toronto, 1977) 311-50.

The oil sands levy. Currently set at 50 cents a barrel on all oil products sold in Canada, this tax is earmarked to cover the cost of the difference between the domestic and world prices on oil produced from Syncrude and Great Canadian Oil Sands Ltd, whose output, by agreement, is sold at the world price level. With a possible daily output of 145,000 barrels a day and a $10 subsidy per barrel, the cost exceeds $500 million. Presumably the oil sands levy is set to break even, so Ottawa does not gain from this levy.

Oil export tax. Ottawa, not the producing provinces, receives the revenues from the oil export tax. With the export tax now near $10 and with taxable oil exports about 80 million barrels, Ottawa's revenue from this source is about $800 million. Over time our exports will taper off substantially as existing contracts run out. Offsetting this is the Oil Import Compensation Program. With increasing domestic oil reaching Montreal, our compensatable imports have fallen to about 140 million barrels, or roughly $1.4 billion. Over-all, therefore, Ottawa's net cost of these two programs is over half a billion dollars. Naturally, the higher the domestic price relative to the world price the lower will be the drain on the federal treasury. This provides an important financial incentive for Ottawa to move towards world prices. Moreover, for any given price differential, the net costs will grow over time as our dependence on foreign oil increases and our exports are phased out.

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[20] Douglas Hartle in his background paper for this conference treats this point in greater detail.

Even without considering the various federal policies aimed at encouraging energy conservation and the development of alternative energy sources, Ottawa does not come out as a major net financial beneficiary, so that the earlier conclusion that the producing provinces ought to play a more important role in funding equalization still stands.

But what about the producing provinces? Their argument has been, and presumably will continue to be, that they are already contributing a great deal to the rest of Canada as far as energy goes. Part of their argument is that Ottawa has usurped the revenues from the export tax. In addition, all too often it is forgotten that part and parcel of collecing these resource revenues has been a very significant amount of provincial expenditure (e.g. roads, infrastructure). Most important, with official Canadian policy one of maintaining domestic prices below world levels, the producing provinces can argue that under existing royalty and tax arrangements they are forgoing massive revenues. In 1979 alone, assuming current consumption levels, forgone provincial revenues would approximate $4 billion.[22] If one believes that Canada ought to go to world prices, this represents a transfer of rents from the producing provinces to Canadian consumers. I have some sympathy with this position, but in my view it relates more to who should get the energy rents rather than to the narrower issue of whether or not there exists an inequity in the funding of the equalization program.

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[21] These figures are adopted from Table 1 of John F. Helliwell, 'Canadian Energy Policy,' in Annual Review of Energy 4 (1979) 175-226.

[22] This estimate is based on the assumption that each dollar-per-barrel increase in domestic and international energy yields approximately $1 billion for the energy sector, of which the provincial take is about 40% or $400 million. Since we are over ten dollars beneath world prices, this yields forgone provincial revenues in the order of $4 billion (see Table 5).

Before to turning to what all of this means for the future of equalization payments. I shall look at how equalization payments relate to the pressing current policy issue, that of increasing the price of domestic energy.

THE IMPACT OF A $1 PER BARREL INCREASE IN THE PRICE OF DOMESTIC OIL AND GAS

Row 1 of Table 5 shows the effect by province of raising the price of domestic oil by $1 a barrel and the price of natural gas by 14.65 cents per thousand cubic feet (85 per cent of the heat-equivalent oil increase). Consumption levels are assumed to remain unchanged, as are the current prices of other forms of energy (e.g. hydroelectricity). The total transfer to the energy sector [23] is roughly $900 million. Ontario's share is $323.2 million.[24]

Row 2 presents an estimate of the royalties going to the producing provinces. Underlying these figures is the assumption that total revenues will amount to $1 billion. In turn this assumes that Canada's exports of natural gas will also rise in price. Since they are already sold at world prices, the row 2 figures implicitly assume a $1 per barrel equivalent rise in the world price of natural gas. With current royalty arrangements, 42 per cent of total industry revenue will accrue to the producing provinces. The remaining $600 accrues principally to the oil industry, with perhaps 10 per cent to Ottawa, although with sufficient exploration expenditure Ottawa's revenues from corporate taxes can fall essentially to zero as noted above. These totals are not included in Table 5. Hence the $420.8 million total for producing provinces' revenues (excluding corporate income taxes) in row 2 of Table 5.

Rows 3 and 4 present the equalization entitlements arising from the

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[23] Note that this transfer is not entirely to the domestic energy sector. For Atlantic oil, for example, the transfer is really to Ottawa since its compensation per barrel falls by $1, unless the world price rises as well, in which case the transfer effectively goes to the exporting nations.

[24] A recent paper issued by Premier Davis of Ontario suggests that the cost to this province of a $1 per barrel increase in domestic oil and gas would be $310 million (see W. G. Davis, Premier of Ontario, Oil Pricing and Security: A Policy Framework for Canada, August 1970, 5).

TABLE 5

Selected input of a $1/barrel rise in the price of energy

		NFLD	PEI	NS	NB	QUE	ONT	MAN	SASK	ALTA	BC	TOTAL
1.	Cost to Provinces ($ million)[a]	18.1	3.9	30.8	30.8	199.2	323.2	30.0	40.5	123.1	86.0	890.7
2.	Royalties for producing provinces ($ million)[b]						0.9	1.5	28.0	361.8	28.6	420.8
3.	Resulting equalization increase ($ million)	5.1	1.0	7.6	6.3	56.2	0 (75.4)[c]	8.3	-6.4	0	0	78.1 (153.5)[c]
4.	Funding allocation for equalization ($ million)[d]	1.1	.2	1.9	1.5	18.4	30.2	2.8	2.6	9.4	10.0	78.1
5.	'Net balance' ($ million)	-14.2	-3.1	-30.2	-26.0	-161.4	-352.3	23.0	-21.5	+229.3	-67.4	

a) Based on 1978 consumption levels, these are calculated as the sum of the costs of crude oil and its equivalent, natural gas, and LPG's. The crude oil consumption levels by province are taken from the December 1978 issue of Refined Petroleum Products (Statistics Canada, 45-004) Table 2 (utilizing 'domestic disappearance'). Natural gas consumption by province is taken from the December 1978 issue of Crude Petroleum and Natural Gas Production (Statistics Canada: 26-006, Table 5, lines 18 through 24). Data for LPG consumption by province (net of that reported from the crude oil and equivalent sources) was estimated from NEB data. The price of natural gas was assumed to increase by 85% of the heat equivalent increase in oil. Specifically a $1 per barrel increase in oil was assumed and a 14.65 cent increase (per mcf) in natural gas.

b) Assumes roughly $1 billion in revenues to the oil and gas industry. Royalties are assumed to average 42%, yielding the $420.8 million total. Revenues from corporate income taxes are excluded for this calculation. Gas equivalent price increase assumed to be 15¢/mcf. Adapted from Courchene and Copplestone.

c) This would be the increment to Ontario's equalization payments (and therefore to total equalization flows) if Ontario were eligible to receive equalization.

d) Assume Ontario will not receive equalization payments.

NOTE: On the revenue side this table ignores the flow to the oil and gas industry as well as federal and provincial revenues (especially corporation income taxes) that would ensue.

royalty increase and the allocation of the cost of equalization across provinces in accordance with the funding ratios in row A.1 of Table 4. Assuming that Ontario will not be eligible for equalization payments, the total equalization flows under current arrangements from a $1 per barrel increase in the price of domestic energy is $78.1 million. If Ontario is included, the level of equalization payments essentially doubles to $153.5 million, as shown by the figure in parenthesis beneath the last entry in row 3. On the other hand once we reach the one-third resource lid for equalization payments (and regardless of how it is defined, this will be reached well before Canada gets to world prices), equalization payments will not increase as the price of energy rises. The final row Table 5 presents the net 'balance.' Only Alberta comes out on the plus side.

The Table 5 figures show in rather bold relief the magnitude involved in the current energy debate. Moreover, since the current domestic price is roughly $10 below world levels, the impact of moving to world price levels is massive indeed. Even though rising energy prices will curtail demand and run the equalization program into the one-third resource limit, a rough indication of the results of selling domestic energy at world prices can be obtained by multiplying the Table 5 figures by ten. Seen from this perspective, it is clear that the system of equalization payments is not the critical issue in the policy debate on energy in 1979. In the 1973-4 era equalization payments played a far greater role not only because the formula was open-ended, but also because energy royalties were equalized in full. Indeed, only after the formula was amended were domestic prices allowed to rise. As noted above, after one or two more dollar-per-barrel increases the program will run into the one-third limit, and from then on energy prices will not affect equalization payments.[25]

In summary, therefore, though concern over equalization payments is not likely to dominate the current policy debate, nonetheless there are some important and unresolved (probably unresolvable) issues relating to equalization. To these I now turn.

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[25] This is not quite correct. Once the one-third resource limit is reached, each $1 increase in equalization payments arising from non-resource revenues will generate an additional 50 cents in resource-related payments in order to preserve the one-third limit, and vice-versa.

IMPLICATIONS FOR EQUALIZATION PAYMENTS

The original and presumably current rationale for equalization payments was to ensure that no province had to resort to unduly high levels of taxation in order to provide some 'average' level of public services. However, under the 1967 revision of the program the operational definition effectively became one of bringing all provinces' revenues up to the all-province average.

These two approaches are really quite different. In effect, what Ottawa is saying with its recent amendments is something like this: 'just because Alberta's revenues are soaring does not mean that it now costs Nova Scotia proportionally more to provide this (undefined) average level of public services. Accordingly, resource revenues are no longer fully equalized.' Pragmatically, however, the modifications were brought about because Ottawa could no longer afford to equalize the rising resource rents, especially since it was unable to acquire a larger share of them.

To my mind this raises two issues. First, how large should equalization payments be? Second, how should they be funded? I doubt whether either of these questions has a well-defined answer, but I shall venture some opinions.

At one extreme is the suggestion that equalization payments should be utilized as a means of sharing the energy rents. This might take the form of attempting to reintroduce the concept of bringing all provinces' revenues up to the national average level. Funding considerations aside, I have little sympathy with this approach. Energy rents represent a transfer from the private sector to the oil and gas industry on the one hand and to governments on the other. In my opinion these rents, if they are to be shared, ought to be returned to the private sector, especially to those areas of the private sector where adjustment to rising energy prices is most difficult. Transferring funds to provincial governments is not likely to serve this goal. But alternative funding arrangements for the existing level of equalization payments that put more responsibility on the producing provinces would indeed share some of the energy rents.

Alternative rent-sharing arrangements would lead to quite different levels of equalization and not always to larger levels. Consider the following scenario. Suppose Alberta chose to distribute the annual inflow of royalties to its residents on, say, a per capita basis rather than simply pocketing them as it now does. The royalties would then enter the personal incomes of Albertans and would generate income taxes to both Ottawa and Alberta. As a result of Alberta's rising personal income tax revenues equalization payments would increase, but the increase would be nowhere near the levels derived from the current treatment of energy royalties. Moreover, under this approach Ottawa would obtain far more revenues from energy than it currently does and Alberta far less. Yet the impact of a $1 per barrel increase in domestic oil and gas consumers would remain unchanged, i.e., the first row of Table 5 would still apply. In other words, equalization flows from energy depend on the manner in which these rents are shared among Ottawa, the producing provinces, and the industry. Until rent-sharing is settled, equalization as it relates to energy will remain in limbo.

Continuing with this hypothetical example, the principal reason why Alberta would not contemplate distributing its energy royalties to its residents is that income is taxed differently in the private sector than it is in the public sector. In particular, Ottawa cannot 'tax' Alberta's royalties. Nor can it 'tax' the growing yearly interest flows that the Heritage Fund is generating. By establishing this fund and utilizing it to reduce present and future taxes in the province, Albertans are in effect obtaining the full (i.e. pre-tax) value of the royalties. It is probably not an understatement to suggest that the entire policy debate over rent-sharing would be but a tempest in a teapot if income was treated identically for tax purposes whether it accrues to the private sector or to a government.[26] Indeed, such a provision would also remove the financial incentive that now exists for provinces to nationalize or 'provincialize' resource-sector enterprises.

In general, therefore, my answer to the question of how large the flow of equalization payments arising from energy should be is that it depends on the answer to the more important issue: who gets the energy rents.

On the second issue, the funding of the current equalization program, I have less difficulty seeing my way to a specific conclusion. Basically,

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[26] This proposal to have energy revenues treated as if they were accruing to the private sector is not a new one. See W.P. Gainer and T.L. Powrie, 'Public revenue from Canadian crude petroleum production,' Canadian Public Policy/Analyse de Politiques (1975) 10. As Gainer and Powrie point out, Section 125 of the BNA Act forbids the taxation of one government's revenues by another government so that implementation of this principle would have to be negotiated through revenue-sharing agreements.

Ottawa should not have undertaken to equalize revenues that are entirely under provincial control. But it did. And the result has led to a serious inequity in funding equalization flows arising from energy. To put it starkly, why should Ontario's residents be called upon to contribute $346 million each year to pay for the equalization that arises because Alberta is pocketing $4 billion annually (from rows B.3 and B.4 of Table 4)? The combined principles of co-operative federalism and the ability to pay suggest that the producing provinces ought to bear a larger portion of the equalization flows arising from energy. Whether this should take the form of a sophisticated two-tier system for equalization payments where resource revenues would be equalized along the lines of an interprovincial revenue-sharing pool or whether it should take the form of a simple levy on royalties or some other method is a separate issue.[27]

At a more mundane level there are still a few details to sort out with respect to equalization payments. In particular, should Bill C-26 be reintroduced? I do not think so. One of its provisions was to reduce equalization payments by phasing out 'sales of crown leases' from the formula. This would save Ottawa some money but probably only on a temporary basis, unless the federal government has in mind preventing the energy-producing provinces from garnering any royalty increases that would normally be generated from rising domestic energy prices. One or two more dollar-per-barrel increases will run the equalization program into the one-third resource limit and effectively put a lid on energy-related flows. Why bother attempting to put a temporary lid on equalization flows when the likelihood is that by the time the appropriate legislation would pass Parliament the one-third limit (even excluding the crown leases category) would be effective.

The second provision of Bill C-26 was an attempt to keep Ontario from receiving an equalization payment. The basis for this exclusion was that Ontario's per capita income is above the Canadian average per capita income. True enough. But equalizing per capita income is not what the present equalization program is all about. Rather it has more to do with equalizing per capita provincial revenues. Interestingly enough, at one point during the process of renegotiating equalization payments leading up to the 1977 Fiscal Arrangements Act Ottawa suggested that personal income per capita ought to be the basis for deciding on the level of equalization payments. However, this view was rejected in favour of the acceptance of the existing program which, although modified for energy rents, essentially equalizes provincial per capita revenues. This being the case there is no reason for excluding Ontario from being a beneficiary of the program. With Prince Edward Island receiving $626 per person and Quebec receiving $241 per person, surely no one can take offence at Ontario's receiving $20 per person, as would be the case for 1979-80 (see row 2 of Table 2).

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[27] See Courchene and Copplestone, (Canadian Tax Foundation, forthcoming) for an analysis of a two-tiered proposal for equalization payments.

One remaining question relates to the manner in which the resource limit has been implemented. My recommendation is that, for each of the receiving provinces, the lesser of its resource entitlements and its equalization payment should enter the numerator of the ratio (the denominator is, of course, total equalization payments). For the seven traditional provinces this would yield the $889 million that appears as the last column of row 5 of Table 2 plus the entitlements arising from the non-energy resource revenues. For Ontario, the entry would not be its $860 million entitlement but rather its $172 equalization payment (row 5 and row 1 of Table 2). Under this interpretation, the ratio of resource-related payments to total equalization flows for fiscal year 1979-80 would be 34 per cent, which effectively means that the resource limit has already been reached. Nonetheless, if Ontario is to get an equalization payment, this should be reflected in computing the resource ceiling. And since the rationale for excluding Ontario from becoming a recipient province is questionable, I prefer the approach outlined above for the implementation of the one-third limit.

No doubt the Atlantic provinces will take exception to any of the likely interpretations of the one-third resource limit because their resource ratios are currently nowhere near that level (row 6 of Table 1). A far more generous interpretation from their vantage point would be to allow energy royalties to enter the formula until each province hits the one-third limit. However, such an approach would ignore the very substantial subsidy the Atlantic provinces are receiving from the fact that Ottawa guarantees that the domestic price of oil applies across the country. A rough and ready estimate of the value of the Oil Import Compensation Program, by province, over the next year is[28]: Newfoundland $179 million, Prince Edward Island $39 million, Nova Scotia $355 million, New

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[28] This assumes that compensatable imports are 140 million barrels and

Brunswick $306 million and Quebec $521 million. Except for Quebec, these figures exceed, by a factor of three or four, the value of equalization payments arising from energy for these provinces (compare them to row 5 of Table 2). Even though it is true that this subsidy will disappear when the Canadian price reaches the world level, it is very difficult for the Atlantic region to claim that they are hard done by in current Canadian energy policy.[1]

CONCLUSION

Equalization payments are an integral part of the glue that binds our nation together. Surely no Canadian would question their existence or their importance. Nonetheless some important issues have arisen concerning their magnitude and their future role. They are but one weapon in our arsenal combating regional disparities. On the other hand they have undergone a series of amendments and modifications in the wake of rising domestic and international oil prices, so much so that there is now something arbitrary both in the conceptual framework underlying them and in the manner in which they are being implemented. The thrust of this paper is that this arbitrariness is likely to continue until Canada can sort out the more important issue of how the energy rents ought to be shared among the various competing interests. The principal conclusion of the paper is that the resource-rich provinces are not bearing their fair share of the equalization payments generated by these resource revenues. Although specific ways of rectifying this funding imbalance were not addressed in the paper, my own preference is a two-tiered system where the second tier would be an interprovincial revenue-sharing pool for the revenues arising from natural resources.

Equalization payments and therefore their role in our confederation come up for review in 1982. It is high time that Canadians in all walks of life take time to apprise themselves of the issues and prepare to lend their expertise to these important deliberations.

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that the average subsidy per barrel is $10. All Atlantic province oil consumption is assumed to be compensated (data are obtained from Statistics Canada publication 45-004), and the remaining imports are assigned to Quebec.

S. Dupre

As an occasional student of federal-provincial fiscal relations, I wish to compliment Professor Courchene on his presentation and more generally to thank him for the many contributions through which he has shed light on this murky subject in recent years. I agree with him that the system of equalization payments is not the critical issue in the policy debate over energy in 1979. I also agree, however, that it complicates the policy discussion, not least because, in his own words, 'equalization payments are an integral part of the glue that binds our nation together.'

As someone who pretends to be a political scientist, particularly in the company of economists, I have a major concern for Canadian unity, and my remarks will reveal my disciplinary bias. Permit me to present the comments that Professor Courchene has inspired me to make under two headings: (1) Probing the obvious with a sense of discovery; (2) The federal-provincial bargaining climate.

PROBING THE OBVIOUS WITH A SENSE OF DISCOVERY

I am filled with admiration for the lucidity with which Professor Courchene has translated the equalization formula into literate English. I likewise admire how he has conveyed, through simple examples, the manner in which the equalization formula works, or more accurately no longer works. Let me repeat what he has made obvious. It is true that by including normal resource revenues the current equalization formula takes account of a revenue source that is arbitrarily available in only a few provinces by the gift of nature or, if you prefer, an Act of God. It is also true that, given a zero tax base in the provinces not favoured by nature, these provinces qualify for an equalization payment from energy that amounts to a per capita grant. As Professor Courchene puts it, the per capita value of this energy grant approximates $100 and Quebec, for example, with a population of 6.3 million, receives $639 million in equalization payments from oil and gas.

Ottawa is left with an undertaking to equalize revenues that are entirely under provincial control, and its current revenue base gives it no share in the windfall revenues that, arbitrarily accruing to certain provinces, increase the federal commitment to make grants to other provinces. Finally, the equalization formula is in no sense an interprovincial equalization program. A total negative entitlement, however large, simply means that the government of a rich province receives a zero equalization grant. It does not mean that the rich provincial government makes a contribution to the equalization pool.

Even when I am faced with such obvious facts I still can never resist the temptation to probe the self-evident. My first probe was motivated by the fact that the political boundaries of the jurisdictions covered by an equalization arrangement can affect the volume of equalization payments under any given formula. Keeping the existing equalization formula in place, I indulged in the following bit of science fiction, or more accurately fiscal fiction. Let us suppose that those who, a decade ago advocated One Prairie Province had had their way, thereby replacing Alberta, Saskatchewan, and Manitoba with a single province. Would Professor Courchene have written the same paper for this conference?

Almost undoubtedly he would have. In the event of One Prairie Province, the $3 billion equalization bill that the federal government faces in 1979-80 would have fallen by only a paltry 10%, namely $307 million. This is because One Prairie Province has an over-all negative equalization entitlement which more than absorbs the current positive entitlement of Saskatchewan and Manitoba. Of course the negative entitlement of One Prairie Province means simply that this jurisdiction receives a zero equalization grant. All the defects of the present formula are still in place. But Alberta has absorbed a small part of the federal equalization bill.

Whatever may have been said on its behalf ten years ago, One Prairie Province is now more than ever an exercise in fiscal and for that matter political fiction. Currently, Alberta's revenue from energy is $2005 per capita. The per capita energy revenue of One Prairie Province would be only $1098. Surely charity begins in Edmonton!

Please indulge me my second and last flight into fiscal fiction. Out of sheer fancy I assumed that Newfoundland's wildest energy dreams had already come true and the per capita energy revenue of this province was the same as Alberta's. Entered into the equalization formula under the prevailing method whereby half of the energy revenues are available for equalization, the result for Newfoundland is a negative entitlement for energy alone of $754 million. This negative amount changes Newfoundland's over-all positive entitlement of $338 million into an over-all negative entitlement of $416 million. But of course under the formula the size of the negative entitlement is of no consequence; all that matters is that Newfoundland no longer has a positive entitlement. Its equalization grant disappears; the federal treasury has 'saved' $338 million.

But what happens to this 'saving?' Subject to a more careful check of the ambiguities of the one-third limitation than I have been able to make, it appears that the national per capita revenue from energy eligible to enter into the equalization formula has jumped, because of Newfoundland's windfall, from $99.79 to $131.12. The federal government must accordingly increase equalization grants as follows: PEI. $4 million, Nova Scotia $27 million, New Brunswick $22 million, Quebec $201 million. By the time I reach the Ontario border, all that remains of the federal 'saving' of $338 million is $84 million. In the absence of Bill C-26 or other arbitrary caps on Ontario's claim for equalization, its current positive equalization entitlement of $172 million becomes $445 million, and the federal treasury is beset by a claim whose magnitude makes it that much more difficult to deny.

I have probed the obvious only to make the following point. It is proper that the key concern of this conference should be the reverberations that can be expected from raising the domestic oil price to a world level that is $10 per barrel higher than what prevails. However, even if we did not face this particular situation, the defects of the current equalization formula are sufficiently blatant to warrant a fundamental reappraisal. Professor Courchene has made some proposals, and I find them entirely worthwhile.

Since all proposals are grist for the federal-provincial mill, let me simply add my own. It is true that we do not have anything that resembles interprovincial equalization and, as Professor Courchene points out, that the constitutional incapacity of the federal government to tax provincial revenue is a barrier.

On the other hand the federal spending power remains unfettered. I can think of no constitutional barrier to amending the Federal-Provincial Fiscal Arrangements and Established Programs Financing Act to stipulate that the EPF payments to any province with a negative equalization entitlement from energy and an over-all negative entitlement should be reduced by the size of the over-all negative entitlement. Since the spending power is involved the EPF payment could not be less than zero.

Alberta's revenue would accordingly fall by only about $300 million. My proposal therefore hardly constitutes a solution. I put it forward, however, simply because it constitutes yet another means of testing whether the waters of federal-provincial bargaining could support a step in the direction of the second tier of interprovincial equalization that Professor Courchene has in mind. The more we test these waters the better, for the energy case has churned them into a turbulence that I find positively awesome.

THE FEDERAL-PROVINCIAL BARGAINING CLIMATE

Political scientists who have studied federal-provincial relations since 1965 frequently cite fiscal and economic negotiations as the success story of Canadian federalism, in sharp contrast to the fruitless and frustrating quest for a constitutional amendment formula and for constitutional change. The explanation for this success is that fiscal and economic matters are tangible and quantifiable, and hence more amenable to negotiation and compromise, than constitutional matters, which are symbolic and abstract. The current energy situation concerns me above all because the fiscal and economic stakes uncomfortably resemble those that have plagued constitutional conferences.

Let me emphasize the symbolism of what is involved. Public expectations of contemporary government go beyond income distribution, economic growth, and stabilization. Governments are expected to redress past inequities among individuals and groups, whether on account of sex, language, or ethnic origin. Indeed they are expected to engage in affirmative action to secure the desired end result. In Canada, Quebec's Bill 101 provides a perfect example. There exists a long-nurtured grievance that French-speaking Quebeckers have been denied economic opportunity, especially in the private sector. Bill 101, which looks to the transformation of the linguistic face of Montreal, provides affirmative action to remedy this grievance. While there are political differences over certain parts of Bill 101, for example the educational provisions, the main thrust of the bill as it affects private sector employment enjoys overwhelming popular support in Quebec.

Consider now the rents that Alberta is reaping from energy. The historical ingredient of Western alienation is a sense of economic opportunity that has been denied by a colonial relationship to Central Canada.

Alberta's windfall provides the means to affirmative action that will redress the perceived inequities of the past. Affirmative action is sought to endow the Alberta economy with more significant secondary and tertiary sectors. The Heritage Fund, if you will, is in symbolic terms to Alberta what Bill 101 is to Quebec.[1]

At this point symbolism haunts federal-provincial bargaining over energy. In such circumstances, the chances of success are significantly lessened. We are brought that much closer to the brink of the coercion which Professor Hartle describes in his magnificent background contribution to this conference. And yet we cannot pull back from the brink because the starkest aspect of Canadian unity, the future of Quebec, again comes into play.

In regional terms the current energy conundrum can be well presented, as indeed it has been at this conference, as an Ontario-Alberta dilemma. And in the real world of intergovernmental bargaining Ontario is visibly carrying the torch of the energy-consuming provinces. I consider Quebec's relative silence positively eerie. Why? Because the possible *economic loss* to *Quebec* of a move to world energy prices that is not compensated by a share in the windfall, whether through equalization, income tax credits, or otherwise, is the *political gain* of a Quebec *government* that in a referendum campaign will be striving to show that Quebec derives a negative balance from confederation. And the more Alberta's aspirations for affirmative action are satisfied, the greater Quebec's negative balance could become.

Here is the point at which I find Professor Hartle's broad prescriptions all the more attractive, not only in terms of allocative efficiency and distributional equity, but for the sake of Canadian unity. To be sure, his suggestions place a ceiling on Alberta's affirmative action program. Will this be tolerated? Or do we fall over the brink into coercion? I do not know the answer.

I do believe, however, that one thing we have learned from affirmative action is the importance of implementation. So long as the symbol of affirmative action is respected, the political climate can often tolerate implementation at a slower pace. This appears to be borne out in the case of Bill 101. In the Alberta case a slower pace of implementation that still respects the symbol of affirmative action could be found in some of the borrowing suggestions that have recently been floated in the press. I lack the skill with which to estimate the fiscal and economic consequences of, for example, interest-free loans by Alberta to the government of Canada of any part of the windfall that would accrue to that province from a move to world energy prices. But I sense that subsidized borrowing, because it respects the symbol of retained means for affirmative action, admittedly discounted, belongs on the federal-provincial energy agenda along with the other possibilities.

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[1] See J. Stefan Dupre and Paul C. Weiler, 'A sense of proportion and a sense of priorities: Reflections on the Report of the Task Force on Canadian Unity' (forthcoming).

Energy transforms the fiscal and economic agenda of Canadian federalism because it is permeated with the symbolism that has plagued constitutional negotiations. What about the extent to which the fiscal and economic agenda at least avoids the other pitfall of constitutional negotiations because energy matters are tangible and quantifiable, and thus amenable to tight negotiation? Fortunately, these matters are indeed quantifiable. But I must offer this note of warning. It is one thing to quantify tax shares as we did in the sixties and the seventies. It is quite another to estimate the level and distribution of economic benefits that can accrue from faster or slower moves to world energy prices. Here assumptions and conjecture play a non-trivial role, and governments are quite able to find different experts who will provide different answers. The debate raging at this conference is a case in point.

With his characteristic economy of words, my friend and colleague Albert Breton closed an account of the federal-provincial complications of the 1973-4 energy crisis as follows: 'one is reminded that the almost unbelievable problem-solving capacity of the Canadian federal structure may be partly the result of the fact that Canadians insist on solving problems which, with a little more foresight, could have been avoided. Practice may not make perfect, but it is certainly a way of learning by doing.[2] Certainly foresight might have kept us from adopting the equalization formula that is now in place. But energy with all its ramifications definitely offers us yet another major opportunity of learning by doing, and this in a most inhospitable learning environment.

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[2] Albert Breton, 'The federal-provincial dimensions of the 1973-74 energy crisis in Canada,' in W.E. Oates, ed., The Political Economy of Fiscal Federalism, (Lexington, 1977), 112.

D. G. Hartle

It seems to me that equalization is a way in which the residents of the provinces that have relatively low incomes are essentially compensated for their losses. It may be because of history; it may be because of geography; it may be because of Sir John A. Macdonald's tariffs. There could be a whole range of reasons. Equalization is an attempt to suggest that by being a Canadian you are compensated if you happen to live in one of the poorer provinces, or happen to be a poor individual in one of the provinces.

The trouble is, of course, that we have so botched the tax system and the regulatory system that the only way in which we now can look at the relative wealth of people and regions, is in terms of the revenues of the governments of the region where we happen to live. People talk about Ontario as though it were an entity as distinct from the people who happen to live here, and Alberta in the same way. I think the terminology we are using about governments basically masks the fact that behind these governments there are people. There are rich Ontario people, and there are rich Alberta people, and there are very poor people in both provinces. It seems to me that equalization, by transferring money through an intermediary, essentially the federal government, by taxing individuals and handing the money to governments, has made the process seem much less personal, more abstract, than in fact it really is. So we have combinations of DREE programs, for example, that try to enrich equalization. We also have subsidies on freight rates and so on. The thing has become so convoluted now that I think the very notion of government is being put into jeopardy. If indeed the natural resource revenues were part of the tax base and if the capital gains of individuals were taken into account in the tax system, I think it would be much more satisfactory to have the money transferred from individuals to other individuals without regard to their place of residence.

What I would like to suggest is that we go to a system that essentially puts integrity back into the tax system. All of these problems essentially result from the fact that the tax system is so poor. We have made concession after concession and regulations to get around other concessions, and in the attempt to bail out this, that, and the other thing no longer can any person really feel that his taxes are going to other people. They are essentially going to these amorphous things called governments.

People are what we care about, and the question is whether people are individually paying their share of the burden and distributing it to other individuals who need the money. At the same time, we do not want to have this redistribution of income interfering more than it needs to with the allocation of resources. I think the equalization effect is simply a manifestation of the complexities, by giving away this and protecting against that, by pretending that Ontario cannot be a have-not province, the whole thing will lose its legitimacy. Perhaps the best thing would be for the have provinces to transfer the money direct without the intermediation of the federal government, to the have-not provinces. Rather than giving the money to other governments, we should be giving it to people.

Discussion

COMMENT: Tom Courchene mentioned that the form of equalization is becoming increasingly arbitrary. That's just not so. It's always been arbitrary. Equalization didn't start in 1967, it started in 1867; and it lasted only a few years before the classic arbitrary changes began.

Modern equalization began with the tax rental period during the war years, and became explicit as early as 1957 with a formula that lasted five years. It then became evident that natural resources were creating a terrible problem for us. Alberta was receiving equalization payments, because at the time equalization was based on income taxes and Alberta was below the average income tax level. So natural resources were introduced into the formula and Alberta was excluded. That lasted three years. In 1962 they brought the formula from the top two provinces to the national average. These two governments then said 'we can't equalize like that. That's terribly arbitrary. We are going to make the proper moves. We'll equalize taxes at the national average, but we will subtract 50 per cent of the province's natural resources.' That solution lasted until 1967. Major changes were made at that time and lasted until 1973, when the price of oil shot up. Arbitrary changes were made again. In 1977 more changes were made in an effort using the one-third limit referred to, to anticipate possible further dramatic resource price increases. Today we expect that one-third limit to come into play soon.

My point is that equalization arrangements have always been arbitrary and that is a fact of fiscal federalism. I see no reason to get excited about the fact that we're having some problems now. We will solve them the same way as in the past, by further arbitrary decisions. The formula always has to pass the political test, because as Tom Courchene says no one can determine the exact or precise equalization. It's not scientifically calculable. It all depends on the state of the nation, and as that changes formulas change accordingly.

Finally I am quite concerned about the tone of much of the writing about equalization. We have a tendency to believe the whole matter is so horribly complex that only a handful of people understand it and to throw up our hands. That is nonsense. It can be understood. Has anyone read a lease lately or life insurance policy? The equalization formula is no more complex than that. We deal with things every day without understanding them down to the last word. Those who want to look at equalization and study it can do so and there are enough constructive ideas around that we could get the broad-ranging, instructive discussion we need.

J.S. DUPRE: I think it is of course quite right that in the last analysis we are going to be arbitrary. Arbitrary is acceptable so long as the proposals meet the basic political test.

Another problem, as Dr Courchene has pointed out, is that, increasingly, basic political tests are no longer the basic commonsense tests they used to be. The thing that does worry me about the equalization formula is that if you keep on excluding Ontario the commonsense test somehow does not come out the right way.

QUESTION: Do you feel that there is some basis to the view that Alberta has been treated as a colony by the colonial east?

J.S. DUPRE: I've read just enough to have a feeling that there's a great deal of bluff in that view. To me the question is immaterial. It is the perception of the denial of economic opportunities that counts. That kind of perception is almost international. Validity aside, governments have to respond to public expectations.

COMMENT: In 1947 at a federal-provincial conference discussing the future of tax rental agreements and fiscal federalism, there was a great push by Ontario and Quebec to do away with the whole concept of tax rentals. The have-not provinces at that time believed that this would be detrimental to their fiscal stability and to their revenues. Colonel Drew who was then premier of Ontario, said he thought there was no difficulty in the rich provinces coming to the view that they should contribute to a fund which the poor provinces could then draw upon. That seemed to strike some responsive chord with the premiers except for Mr Douglas, who said he really thought that this was a function of the federal government and he as premier of Saskatchewan was not going to be content to come every year to the Christmas poor box at Queen's Park.

Now in a sense we are having a revival of the notion of a Christmas poor box by a number of the resource-rich provinces. I have been hearing the suggestion in a modern version from Tom Courchene. You will find it also in the Pepin-Robarts report. But I have yet to hear any suggestions from Ontario as to how they are going to bring this about. How are you going to bring about a voluntary contribution from Mr Lougheed and Mr Bennett, or Mr Blakeney? That is the political and the operational problem that we need some light upon. There is no way in which the federal government can be arbitrary and bring this about.

This refers of course to equalization. The same thing essentially applies in the case of resource rents. Unless the federal government can take some arbitrary action to lay its hands upon economic rents, there is no prospect for adequate redistribution.

I have one suggestion. On the question of energy pricing, it seems to me that the answer really lies in the old saw about prizes for everybody, one of Doug Hartle's favourite concepts. Any solution has to be a mix of things, including taxes and price increases, and that is obviously how the policy eventually will emerge.

But instead of laying the whole burden of tax upon the federal government, there is an obvious way in which all provinces can be involved, and this of course is in sharply increased taxes on gasoline and on all fuels. They will then take some of the political flack, not only from Alberta but also from their own people, but at least they will be exercising the degree of responsibility they are now sloughing off on the federal government.

D.G. HARTLE: I think that is a fair comment, Mr Shoyama. Of course they would like to slough off the burden on the federal government, but then what else is the federal government for?.

J.S. DUPRE: When I advocate interprovincial equalization of the kind Tom

Courchene talks about, I do not have in mind the voluntary payments of provincial governments into a pool. Arranging direct transfers from have provinces to have-not provinces is like setting out a management-labour bargaining system where strikes are banned and there is neither a conciliator nor an arbitrator. In the last analysis I think the federal government has to have the central role as conciliator and arbitrator. As such, it is going to be arbitrary. When I fly a kite like amending the EPS Act so that equalization payments will fall to zero when a province has a negative entitlement, this is something that could possibly be included in the conciliation or arbitration board report.

T. COURCHENE: I accept the point that the whole thing is obviously arbitrary. In 1967 there was a certain symmetry. We had forgotten about the original role of equalization, which was to make sure that the provinces had enough money to give some sort of average level of service without an unduly high tax rate. That went by the wayside because it was too difficult to define what this average level of public service would be or what was an unduly high level of taxes. So we forgot about the expenditure side, which was really the thrust behind it, and we said 'let's make sure that every province has access to national average revenues.' That was fine until somebody's provincial revenues started going sky high. Even though it is arbitrary, there is a certain accuracy in saying that just because Alberta is getting these fantastic windfalls at the same time it is not true that it costs proportionately that much more for Nova Scotia to provide the average level of public service. While the change has been arbitrary, there is some point, if you are going to follow this formula, at which you would not want everybody to have Alberta's per capita revenue. So in that sense, even though it's arbitrary, it did make some common sense.

When we come to Bill C-26, it says that since the sale of crown leases, which were not very important in 1973, are now worth three-quarters of a billion dollars we ought to think about the formula. But then I ask 'what's next?' That is the arbitrariness I see now, that the equalization program is a watershed. We have to decide just what we are trying to do with it, other than finance it. Otherwise it's at the whim of the latest series of constraints.

I believe it was after Trudeau's August 1 speech that the government initially tried to cut down equalization payments and establish programs of financing. The provinces said NO. They said we'll take it on the equalization formula. So there is another element of arbitrariness that is somewhat different from the arbitrariness mentioned earlier.

On Len Waverman's question of whether Ontario has suffered in confederation, I think too often we take a view of Canada that just looks at it in terms of west-east in Canada.

I grew up with Ontario and Quebec being 'East.' We didn't have a name for the Maritimes. We didn't have a name for the West, just 'the coast.' You grew up in the West with this feeling that Ontario was against you. I have a feeling that Ontario is the one who in the long run is really suffering. There may have been a shift from Alberta to Ontario in the distribution of Canadian industrial activity, but the real constraint is that Canada only has 22 million people, and by not being able to get into the foreign markets the long-term cost to Ontario is incredible. That issue was never brought out in the West.

On Mr Shoyama's point, I guess I feel there is a difference between the people of the West and the governments of the West. Since Confederation it became increasingly important that provinces turn to their local governments or try to offset Ontario. But I think that is going to change once it is recognized that Ontario is having real problems with the energy crisis. Ontario is now a have-not province. I think Ottawa can now try being a true broker in the federation. Ottawa no longer seems an extension of Bay Street. That's a very change in this country.

I think Westerners have tremendous good will. I think it's quite possible we can get some rent-sharing, perhaps through the equalization formula. As Tom Powrie pointed out this morning, we are in fact sharing fifty-fifty now. Alberta has agreed not to sell at world prices. In some sense that is a concession to the rest of Canada. There is rent-sharing, and as I understand him Premier Lougheed is basically agreeing with Bill Davis that there ought to be some sort of a federal development fund.

The time is passing when provincial governments in the West had to fight Ottawa in order to fight Ontario. I think that was necessary once, but I think it's going be less necessary now. I would hope there is more of a sense of sharing in the hearts and the minds of prairie people than we give them credit for.

The Recycling Problem

B. W. Wilkinson and B. L. Scarfe

INTRODUCTION

The recycling problem in the context of the higher energy prices generated by the OPEC oil price increases seems to mean different things to different people, depending upon their position in the economic scheme of things. It is our contention that within the limited context of Canada alone the recycling issue is not really one of whether the funds being accumulated, particularly in the much-publicized Alberta Heritage Savings Trust Fund, will end up back in the income stream. As the background paper for this conference by Peter Campbell makes clear, our financial institutions have been able to cope with the intermediation function quite satisfactorily and are likely to be able to continue to do so. There may have to be continual adjustments in the term-structure of interest rates to match up the preferences of the suppliers and demanders of funds; but there should be no financial recycling problem as such.

The recycling problem is essentially a question of painful, interregional economic adjustment to a much-changed world and domestic environment. But another aspect of recycling has generally been given little attention (although a number of the papers in this conference mention it), and that is the fact that much of the oil and gas industry is under foreign ownership and control. In consequence, a large proportion of funds being channelled to Alberta from the rest of Canada are really being funnelled into the coffers of the foreign-owned multinational oil companies. Also, the high import content of much of the investment needed for Canada to adjust to the changing world environment should be considered briefly in the context of any recycling discussion.

Our paper looks only very briefly at the over-all implications of OPEC pricing behaviour for Canadian real income and real Gross National Expenditure. Then some of the interregional adjustment issues and mechanisms are sketched. Subsequently, the implications of foreign ownership and control of much of the oil industry are considered. We conclude with an examination of a number of recycling options in the light of these observations.

EFFECTS OF THE ENERGY PRICE RISE

Canada in the world [1]

Because Canada has been a net energy exporter,[2] higher energy prices, while probably not directly altering real output, have tended to expand aggregate real income, especially to the extent that resources are mobile from the non-energy to the energy sector or into energy substitutes. However, as the production of new sources of domestic energy tends to require progressively more real resources, any possible expansion of real income will not be as great as otherwise might occur. Also, to the extent that Canada's major trading partners, especially the United States, experience a more serious unfavourable impact upon their economy than does Canada initially, Canada's exports are dampened. Hence, it is not clear that real income will be enhanced for Canada as OPEC prices continue to be raised. The resulting cost-inflationary and demand-deflationary effects upon foreign and domestic income are now well known, and the net results depend upon how nations, individually and collectively, respond to these forces.[3]

From our viewpoint the most important aspect of the macro changes is the effect on total savings. Income will be redistributed regardless of whether total income increases or decreases. The question then arises whether the ultimate gainers will have higher or lower marginal propensities to save than the losers. We return to this issue later in the paper. Within Canada, Alberta, being responsible for the bulk of oil and natural gas production in Canada, has enjoyed an enormous terms-of-trade gain. Prior to 1973 Alberta consistently had a small current account deficit in its trade with Canada and the rest of the world. From 1973 onwards it had a surplus that for 1973-8 inclusive totalled $17.8 billion. This surplus is more than accounted for by the higher fossil fuel prices; if the effect of these higher prices is removed the Alberta current account would have had a small cumulative deficit of $2.2 billion for the same year (Tables 1 and 2).

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[1] Since Tom Wilson's paper gives empirical estimates of the micro and macro implications of higher oil prices, out treatment will be cursory at best. For an earlier estimate of these effects, see G.V. Jump and T.A. Wilson, 'Macro-economic Effects of the Energy Crisis 1974-1975,' Canadian Public Policy (Winter, 1975) 30-8.

[2] T.L. Powrie, Energy Policy and the Balance of Payments: An Outline of the Issues (Calgary: Canadian Energy Research Institute, 1979). Of course, Canada now is a significant net importer of crude petroleum.

[3] For a detailed discussion of general economic effects see W.M. Corden, Inflation, Exchange Rates and the World Economy (Chicago: University of Chicago Press, 1977); Edward R. Fried and Charles L. Schultz (eds.) Higher Oil Prices and the World Economy: The Adjustment Problem (Washington: The Brookings Institution, 1975); Helmut A. Merklein and W. Carey Hardy, Energy Economics (Houston: Gulf Publishing, 1977); T.M.

As for the other provinces and regions of Canada, the effects upon real income and employment are adverse. These unfavourable effects will be smaller the closer the regions are to being zero energy importers. Also, the more substitutable are labour and capital for energy, the more they will be able to reduce the burden of energy imports. (Capital, of course, may be complementary to energy rather than a substitute.) Again, the more mobile are labour and capital between the energy and non-energy sectors, the more internal alternative sources of energy production can increase, which would in turn reduce the structural unemployment that otherwise results. If the region produces, competitively, a high proportion of commodities that are substitutes for oil and natural gas and for energy in general (eg insulation, or perhaps mass-transit vehicles and small cars) or are exportable to the energy-exporting provinces (such as machinery and equipment for fossil fuel production) and relatively few commodities that are complementary to oil and natural gas (such as large gas-guzzling cars), then investment opportunities in the region will be maintained or possibly expanded, so that the interregional macroeconomic adjustment problems will be lessened. Less downward rigidity in real wages within each area would augment these possibilities and help to reduce unemployment difficulties. If the redistribtuion of income within the regions augments savings, this too will help the adjustment processes and minimize the necessity for capital inflows. Such inflows normally help to maintain the Canadian dollar above where it would otherwise be and thus make less competitive the output of the manufacturing sector.

Rybczynski, ed., The Economics of the Oil Crisis (London: Trade Policy Research Centre, 1976); Haim Ben-Shahar, Oil: Prices and Capital (Lexington: Lexington Books, 1976); Department of Finance, Government of Canada. The Effects of Higher Energy Prices on Long-Run Growth (Ottawa: November, 1978).

TABLE 1

Alberta's trade in goods and services with the rest of Canada and the world, 1971-78 ($ billion)

	Current Dollars			Constant 1971 Dollars		
	Exports (X)	Imports (M)	Balance (X-M)	Exports (X)	Imports (M)	Balance (X-M)
	(1)	(2)	(3)	(4)	(5)	(6)
1971	$ 2.7	$ 2.9	$-0.2	$ 2.7	$ 2.9	$-0.2
1972	3.3	3.4	-0.1	3.1	3.2	-0.1
1973	4.6	4.0	0.6	3.6	3.5	0.1
1974	7.8	5.1	2.7	3.5	3.6	-0.1
1975	9.0	5.5	3.5	3.4	3.4	0.0
1976	9.7	6.5	3.2	3.4	4.0	-0.6
1977	11.4	7.3	4.1	3.5	4.2	-0.7
1978	12.1	8.4	3.7	3.4	4.3	-0.9
1971-8 Cumulative	$60.6	$43.1	$17.5	$26.6	$29.1	$-2.5

Note: Not all business service payments are picked up in imports so they must appear in the over-all residual. For 1975-8 the residual is fairly large (1975 = -$408 million; 1976 = -$812 million; 1977 = -$808; and 1978 = -$1049 million. For the years 1961-72 inclusive Alberta had a persistent, although small deficit in its trade accounts, amounting cumulatively to $2.5 billions.

Source: Bureau of Statistics, Alberta Treasury, Alberta Economic Accounts, 1978 (Sept. 1979), Tables 2 and 3

It is difficult to disentangle and assess the net results of these various effects. A few broad observations may be made, however. First, although the Maritimes now appear to be in the least favourable position on a number of these considerations, such as the limited flexibility of much of their labour force, the narrow base of their manufacturing activities, and their questionable scope for attracting savings from internal or external sources into new opportunities, the discovery of commercial quantities of petroleum and natural gas in that region (following from the Sable Island gas find or the offshore Newfoundland oil discovery, for example) could quickly reverse any estimates one might make of their comparative position vis-à-vis the other provinces.

TABLE 2

Alberta's exports of petroleum and natural gas to the rest of Canada and the world ($ million)

	Petroleum		Natural Gas	
	Current dollars	Constant 1971 dollars	Current dollars	Constant 1971 dollars
	(1)	(2)	(3)	(4)
1971	$ 1057	$ 1057	$ 308	$ 308
1972	1289	1271	350	334
1973	1917	1547	413	352
1974	4256	1451	599	350
1975	4055	1198	1404	356
1976	3711	1047	2197	365
1977	4303	1024	2955	399
1978	4677	1014	2959	373
1971-8 Cumulative	$25,265	$ 9609	$11,185	$ 2,837

SOURCE: Alberta Bureau of Statistics

Second, one of the main mechanisms of adjustment used among nations disadvantaged to varying extents by the OPEC oil price increases is not available to the individual provinces in Canada, ie. the exchange rate. In addition the value of the Canadian dollar which may be appropriate for Alberta may not be appropriate for Ontario or Quebec. Hence, a much greater burden is placed upon remaining mechanisms such as diversity in the rates of money wage and real wage increase among provinces, interprovincial labour and capital mobility, labour retraining, and government policies facilitating these alternatives.

If interprovincial or interregional divergence in real wages is not permitted to occur, perhaps owing to union activity, federal wage scales, or some other reason, unemployment will be even greater in the energy-poor areas, and a larger burden will be thrown on the remaining means of adjustment. The unemployment frequently will not be easily reduced by standard aggregate demand policies. Much of it will be structural. To illustrate, plants geared to producing large, gas-consuming automobiles cannot be kept at full employment simply by the usual monetary-fiscal policies for coping with deficient demand.[4] Structural changes will be necessary. The retraining and geographic relocation of workers to handle new jobs opening up such as those associated with the construction, operation, and maintenance of heavy oil sands plants, will be essential.

The need for real wages to differ among regions becomes even more evident when it is remembered that, labour retraining and geographic mobility is a slow process, and without such wage differences private capital flows within the nation may still be perverse in the sense that they accompany the labour flows to the prospering sections of the country.

These brief remarks suggest that the problem of adjustment within Canada to the world oil price increases are substantial. Most people are probably aware of them and, with varying degrees of reticence, are beginning to make such changes as are within their power. In the final sections of this paper we discuss policies that may assist in minimizing the adjustment problems. But first we address that other aspect of recycling, which reflects the fact that Canada is by no means a closed economy.

RECYCLING AND FOREIGN OWNERSHIP AND CONTROL

Over the last few years, analysis and debate have tended to concentrate upon Alberta's differences with Ottawa and Ontario regarding who should get the benefits from energy price increases and upon whether Canadian prices should be raised to world levels. There are allocative reasons, documented elsewhere,[5] why domestic energy prices should be allowed to adjust, albeit gradually, towards international prices. The Wilson and Waverman papers provide alternative perspectives on this question. Our final section returns briefly to discuss which government should receive the advantages from such price increases. First, however, we want to focus upon some of the implications of the very large foreign component of the oil and gas industry, using a simple, easily understood model. We limit ourselves to crude oil, because it amply demonstrates the situation.

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[4] Jan Tumlir 'Oil payments and oil debt and the problem of adjustment,' in T.M. Rybczynski, ed., The Economics of the Oil Crisis, 54-61, has some interesting discussion on the structural or frictional unemployment caused by the dramatic changes from oil prices.

[5] See for example, W.R. Thirsk and R.A. Wright, 'The impact of the crude oil subsidy on economic efficiency in Canada,' Canadian Public Policy, 3 (Summer 1977) 355-64.

For simplicity we initially ignore changes in supply, demand, exports, or imports that may result from higher oil prices and consider a situation where the world price rises by $1 a barrel and the domestic wellhead price by the same amount. Thus, no change in the export tax is involved. We assume that there are no increases in operating costs, such as higher energy costs to pump out the oil, or at least if there are they are minimal and can be neglected. Accordingly, the total price rise can be interpreted as revenue to be divided among governments and either domestic or foreign shareholders of the oil-producing companies. We also view the retained earnings of foreign oil companies, even though reinvested in Canada, as a cost to Canada as well. Such reinvestment expands their control over the nation's resources and the dollar costs to Canadians of future production or price increases of domestic oil as dividend payments or capital withdrawals occur.

The foreign share of the bigger revenues will be that remaining after deducting provincial royalties, federal and provincial corporate income taxes, withholding taxes, and the portion of remaining oil industry profits to which Canadians are entitled.

We employ Alberta royalties, which average about 42 per cent on crown lands - from which about 80 per cent of Alberta's production is derived - and about 12½ per cent on freehold lands - which account for the remaining 20 per cent of Alberta's output.[6] The federal corporate tax rate of 36 per cent is applied to oil profits after deducting the resource allowance on crown lands of 25 per cent of gross revenue from production thereon, less operating costs and capital cost allowances. This allowance in Alberta averaged, for the early part of 1979, about 22 per cent of gross revenue.[7] But since we are assuming no increase in operating costs when the price of oil is raised, we shall use 25 per cent as our figure for crown lands. On freehold the oil producers receive a resource allowance for the full 12½ per cent royalty they pay the private owner, plus 25 per cent on gross revenue after this royalty and others costs are subtracted. Together, these will total about 34 per cent of total additional corporate revenues. (Notice, in passing, that producers on non-crown lands get favoured treatment over those on crown lands.) Provincial corporate taxes are 11 per cent on profits after deducting royalties paid to either the provincial government or freehold owners.

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[6] The 42 per cent is based on Alberta government estimates prior to 1 June 1979. The 12½ per cent is really a maximum on freehold lands. A number of early leases signed with large freehold landholding companies had royalties as low as 9 or 10 per cent. Saskatchewan government royalties on crown lands are higher than those in Alberta, but with lower production rates of most wells in the province, the actual royalties paid as a proportion of output are about 42 per cent, as in Alberta. Freehold lands are responsible for about the same share of total production in Saskatchewan as in Alberta - 20 per cent. Because oil production in the rest of Canada is tiny by comparison with Alberta and, to a much lesser extent, with Saskatchewan, we are able to use total production figures for Canada when making our calculations.

[7] Informal Alberta government estimate.

Federal withholding taxes on dividends to countries with which Canada has a tax treaty, such as the United States, are 15 per cent, although if a company has at least 25 per cent of its shares held in Canada it can qualify for a 10 per cent withholding tax rate on payments abroad.[8] We use 15 per cent, so clearly our estimates of this tax are a maximum. For the extent of non-Canadian ownership of profits after royalties and corporate income taxes we use 82 per cent.[9]

Utilizing these various percentages in the model (see appendix), the foreign share of a $1 a barrel increase in oil prices, in the world and in Canada simultaneously, is over 21 cents a barrel. We pay foreigners more for the privilege of consuming our resources. At 1979 rates of production of around 650 million barrels a year, this modest figure amounts to $138 million a year. If we consider price increases of $10 a barrel, the number becomes more impressive - $1.36 billion. And if a remaining ten-year life on existing conventional oil reserves of about 6.5 billion barrels was assumed, the losses would be many billions more. (These losses would not, of course, be simply ten times the foregoing number, since an allowance must be made for rising recovery costs as existing reserve pools become depleted.)

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[8] Revenue Canada, Information Circular 76-12R.

[9] For 1976, CALURA estimates of the shares that foreign-controlled firms enjoyed of the total mineral fuels industry sales and profits were 83 per cent and 81 per cent, respectively. Statistics Canada, Corporations and Labour Unions Returns Act: Part I (Ottawa: 1979) 152 and 156.

In CALURA reports, a firm is classified as foreign-controlled when at least 50 per cent of the voting shares are held by foreigners. But in practice a large proportion of many firms not classified as foreign-controlled have up to 49 per cent of the shares held by foreign interests. For 1974, the last year in which CALURA reports showed the proportion of profits, sales, and so on attributable to individual categories of foreign ownership (0-4.9%, 5-24.9%, 25-49.9%, 50-74.9%, 75-94.9%, and 95-100%) one can calculate that foreign ownership was accountable for at least 78 per cent of industry profits and 80 per cent of sales.

Some integrated oil producing firms are actually included in the manufacturing statistics for petroleum and coal products. The 1976 CALURA report indicates that foreign-controlled firms were responsible for 100 per cent of profits in that year. If we use the 1974 CALURA report showing separate degrees of foreign ownership, the shares of sales and profits attributable to them were 79 and 78 per cent respectively. Thus, classification problems between the crude production and the processing sectors should not greatly distort the numbers used.

To the extent that corporate income taxes are overestimated because we have not allowed for them to be reduced via charges for additional exploration and development activities - which in turn expand reserves and production of the foreign oil firms in Canada - the costs to Canada are substantially understated. To illustrate, for 1976, the last year for which corporate taxation statistics are available, taxable income was only 72 per cent of profits.[10] If this average prevailed on additional new profits from oil price increases, the total corporate tax rate should be lowered to 34 per cent from the 47 per cent we employed. Conversely, because we have had to use 1976 data on foreign ownership, before the acquisition of Phillips Petroleum and Husky Oils by PetroCan and Alberta Gas Trunk Line respectively, the degree of foreign ownership in the oil industry is overstated, and hence so are the costs to Canada. On balance, however, we believe the former effect is much more important, so our estimate of the share going to foreign-owned firms is probably understated.

Because a portion of Canadian oil production (about 13 per cent for the first half of 1979) is exported to the United States in either crude or refined forms, part of the oil revenues lost to Canadians are merely a payment by US citizens to US or other foreign oil companies and do not come directly out of Canadian pockets. From this viewpoint one might argue that the net cash loss to Canadians would not be 21 cents a barrel but only 8 cents a barrel.[11]

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[10] Statistics Canada, Corporation Taxation Statistics (Ottawa: 1979), Table 2, 60.

[11] Refer to the appendix. Canadian-owned revenue from the proportion of Canadian oil exported is $xy = 0.1007$
Foreign-owned revenue from the proportion of Canadian oil consumed in Canada is $(1-x)(1-y) = 0.1856$
Net additional payment to foreigners from a $1 increase in the oil price is
$(1-x)(1-y) - xy = (1-x-y) = 0.0849$ on the dollar

However, more than the net cash should be considered. We must compare actual Canadian revenues from oil with the greater total revenues that would be possible if oil reserves and production were entirely under the ownership of Canadians. Moreover, if Canadian oil exports decrease towards zero, as they are likely to do, then the actual cash loss coming out of Canadian incomes will in fact be the 21 cents per dollar per barrel.

As we think of moving to world prices for domestic oil - which could also imply an elimination of the export tax on existing exports (which, themselves, are likely to be phased out), the 21 cent a barrel figure is obviously the correct one to use. A price increase of \$15.25 a barrel to a world price of \$29 a barrel would mean, at 1979 rates of production, a cost to Canadians of over \$2.1 billion annually.[12]

We view this actual or potential shifting of funds from domestic sources to foreigners as at least as substantial a problem as the types of East-West confrontation within Canada that have commanded so much attention.

Notice, however, that we are not arguing against raising domestic crude oil price to world levels. Indeed, it is our view that a gradual adjustment towards world prices is the direction we must go. In ignoring the allocative issues and concentrating on the distributional costs, we are merely suggesting that because of the high proportion of foreign ownership of the oil and gas industry in this country there is a potentially large cost to Canadians as a whole if price increases are allowed which do not take the foreign ownership factor into account when the method of increase is devised. Clearly, some revision of the existing structure of royalty rates and resource taxation is required, at least for existing production levels coming from known conventional oil fields (i.e. old oil) as world prices for oil are phased in and the current export tax is removed. Alternatively, or in addition, Canadian ownership of the oil industry should be increased.

One argument that might be advanced against our position is that if foreign-owned oil companies are not permitted to extract the full benefits of the price increases on all existing and future production, the exploration and development of additional supplies will not be stimulated sufficiently.[13] In response, three comments are necessary. First, the distinction between old and new oil must be emphasized. Nearly all the existing conventional petroleum reserves (at least 96 per cent) were discovered prior to 1973, at which time oil companies were found to be making a comfortable rate of return of greater than 15 per cent, even though the average 1972 crude oil price was only $2.77 a barrel.[14] Granted, operating costs have risen about $1.07 a barrel since then (from $0.43 in 1972 to $1.50 in 1978), but that still is not nearly enough of a change to alter the fact that there are enormous economic rents to be obtained from current production of existing reserves. These rents were not picked up by Alberta in crown lease and reservation sales either. Many of these sales took place long before the large oil price rises of the 1970s occurred or were even anticipated.

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[12] Consider the appendix. In this case, the revenue loss per barrel from the proportion of Canadian oil consumed in Canada is \$15.25 (1-x) (1-y) and the revenue gain from the proportion of Canadian oil exported is \$15.25 xy, as before. However, in this case we must also charge the revenue loss due to the elimination of the export tax, which is equal to \$15.25x per barrel. Thus the net loss is equal to \$15.25 (1-y) per barrel. With 1-y = 0.2129 and the production at 650 billion barrels a year, the resulting figure is \$2.11 billion.

It is clear, therefore, that there is no sound economic reason why oil companies should be permitted to reap the gains from still higher oil prices on the great majority of current proven reserves. In fact, using the 1972 price of $2.77 and adding $1.07 a barrel for increased operating costs, one could argue that even at today's price of $13.75 large economic rents are being drained off by the foreign multinational oil companies. Given the royalty-tax structure outlined previously, these would amount to about 82 cent a barrel, or, at current annual rates of production, about $535 million per year. For a nation that claims to need massive capital inflows all the time, and is increasingly going into debt internationally, this seems to be an unnecessary recycling of Canadian wealth to foreign investors.

Second, as Tom Powrie has pointed out in his paper, firms need not finance all new investment from their internal sources. If their proposals are sound they should be able to borrow in the marketplace to meet their financial requirements. This is where financial intermediaries come in.

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[13] Before answering this objection, it may be worth noting that higher energy prices cannot be supported on the basis that they are a means of conserving scarce domestic resources (as opposed to world resources) in any absolute sense. Domestic production will be expanded, not lessened, so that either imports may be reduced or exports expanded.

[14] F. Roseman and B. Wilkinson, 'Who Benefits? the Alberta energy price increases,' Canadian Forum (June-July, 1973) 49, and G.C. Watkins and Karen Sharp 'The long-term cost of Alberta conventional crude oil,' Journal of Canadian Petroleum (January-March, 1970) 22-7.

Thus oil companies need not themselves receive the full benefits from oil price hikes on all present conventional reserves in order to have access to financing for new investment.

Third, even if greater returns to the industry are required to stimulate new exploration and development activity (and this is not clear since there has already been an extraordinary increase in drilling in recent years - from 5597 wells in 1975 to 10,043 wells in 1978 - so that the real constraint now may not be funding but skilled manpower), there are other ways of providing the stimulus.

Exploration and drilling incentives such as extra tax rebates for new expenditures or subsidies for new wells (some of which already exist today) are a way of enlarging the rate of return on investment, and they have the advantage that the funds provided would have had to be used in Canada in the oil industry for expanding Canadian capacity and could not be diverted for use in other industries or other countries. In the process, the incentives could be appropriately devised to encourage greater Canadian ownership and control of the fossil fuel resources.

Much the same can be said of the need to kindle the use of secondary and tertiary recovery methods to extract further oil from old reserve pools. Foreign-owned oil companies do not have to be permitted to enjoy the full benefits of the price increases in order to stimulate the development of additional supplies, which is one of the main reasons for letting energy prices rise towards world levels. Whatever may be the case for development of new and more expensive sources of petroleum energy, it is not true that prices on present reserves need to be raised to generate appropriate incentives. To do so would only add to any economic rents that the oil companies are already obtaining at the $13.75 price. What is necessary is a royalty and tax structure which treats oil extracted by secondary and tertiary recovery techniques much more generously than that extracted by primary techniques.

Another view is that this simple type of analysis cannot shed much light on Canadian as against foreign income gains because the matter is more complicated than allowed for by our model. Foreigners own manufacturing and other companies in Canada as well and export some of their produce. Canadian-owned firms facing changng oil prices also export part of their output. Surely these matters must be taken into account more precisely for any calculations to be meaningful - or so the argument goes.[15]

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[15] L. Waverman, 'The two-price system in energy: subsidies forgotten,'

To allow for these possibilities, however, does not alter our conclusion that the high degree of foreign ownership of the oil industry warrants the development of policies which do not permit a net loss to Canadians in general from raising the price of their own resources. Consider foreign ownership of domestic manufacturing firms selling both to Canadians and abroad. Suppose the internal price of oil is allowed to rise to world level but foreign oil companies are at the same time prevented from obtaining the benefit of the economic rents on existing production which such a policy might allow, so that there is no net loss to Canadians from this source. Suppose also that prior to the increases, as now, Canadian oil prices were below those abroad,[16] so that the foreign manufacturer in Canada had the possibility of gaining some economic rent, or a return above that necessary to keep him in business in Canada. He might obtain this because he was able to sell to Canadians at a price approaching that charged by producers from foreign lands whose costs of energy were higher (assuming competition within Canada did not compete all such extra returns away). Or he might be exporting and getting world prices for his output. Either way, the raising of domestic oil prices to world levels would remove this scope for such foreign-owned processing or other non-energy-producing firms in Canada to gain more than the rate of return required to keep them in operation and would involve some additional redistribution of income from foreigners to Canadians in the process.

Canadian-owned firms exporting part of their output would also lose extra profits on sales abroad as domestic energy prices rose to world levels. Since the firms would have been selling at approximately world prices anyway, even before the domestic energy price increase, this would not be a situation where Canadians lost and foreigners gained. Rather it would represent an income redistribution within Canada.[17] Thus, the introduction of non-energy-producing firms does not in any way invalidate our conclusion that oil price increases should not be permitted to be an occasion for a transfer of funds from Canadians to foreign-owned oil companies.

Canadian Public Policy 1 (Winter, 1975), and Thirsk and Wright (see note 5).

[16] This is not quite accurate since by no means all US production is at world prices of oil. But this does not change the argument; it just reduces the amount of economic rents that foreign-owned firms in Canada might be getting in competition with foreign output.

[17] There may, of course, be exchange rate implications here. But this is a separate issue which need not be introduced at this juncture.

We have focused only on the distribution of the gains from energy price increases with respect to foreign-owned firms. We might also have noted that any economic rents they are able to appropriate are not the only possible source of loss to Canada. For example, as a number of studies have shown,[18] foreign-owned firms generally import a larger proportion of their purchased inputs than do domestically owned firms, thus reducing the potential market for Canadian producers of machinery, equipment, and component parts, and causing greater leakages from the Canadian income stream than might otherwise be necessary.

IMPLICATIONS FOR RECYCLING STRATEGIES

The foregoing discussion suggests that foreign ownership and control of non-replenishable resources is not an irrelevant issue when considering methods of raising energy prices. The export tax route that Canada has been following is certainly a way of preventing a portion of the economic rents from going to foreign-owned oil companies. An excise tax on domestic consumption is a way of doing the same thing inside the country, while simultaneously forcing consumers to reallocate their spending to reflect the world's valuation of energy costs. Drilling and other exploration or secondary recovery incentives can be used to encourage additional supplies of conventional crude production.

These possibilities, however, ignore two other issues of importance in this context: which level of government should receive the economic rents, and how should the funds be spent?[19] These are really aspects of the broad macroeconomic adjustment issues mentioned earlier in this paper. We shall not attempt to discuss these questions in full, for they fall to a large degree squarely in the domain of other papers at this conference. But a few comments can be made.

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[18] Eg., A.E. Safarian, The Performance of Foreign-Owned Firms in Canada (Montreal: Canadian American Committee, 1969); B.W. Wilkinson, Canada's International Trade:An Analysis of Recent Trends and Patterns (Montreal: Private Planning Association of Canada, 1968).

[19] These questions and several other related ones are discussed in a companion piece, T.L. Powrie and B.L. Scarfe, 'The optimal savings question: an Alberta perspective,' prepared for the University of Alberta conference on the Alberta Heritage Savings Trust Fund, 18-19 October 1979.

First, projections of investment needs in Canada in the years ahead in the energy, transportation, and other sectors all suggest that Canada would be well advised to follow policies which augment the national savings rate. Borrowing abroad has been the customary way of meeting shortfalls in domestic savings, but the current magnitude of such borrowings and the increments to service payments resulting therefrom suggests that if Canada can enlarge domestic savings it should seriously consider doing so.

One view is that governments cannot significantly affect the savings rate. More government saving may simply reduce personal saving and so on. We question this view, however, and suggest that, apart from attempting to expand Canadian-owned returns from our energy resources, any domestic distribution of resource revenues should be made only with some national agreement and understanding that a certain (large) proportion be employed for capital formation. Since non-replenishable resources are essentially a form of capital, it is unwise to use them primarily to augment current consumption at the expense of consumption by future generations.

These remarks provide a valuable perspective on the Alberta Heritage Savings Trust Fund. The first question is whether, in view of the vast needs for energy and other investment in this country, a Heritage Fund that accumulates only 30 per cent of the revenues, that is, 30 per cent of the value of resource assets sold off, is sufficient, or should the percentage be even higher? We take the view that it is essential for the whole of Canada that someone undertake the required saving for the days when our non-renewable resource stocks are depleted; the fact that a provincial government is undertaking at least part of this saving may at least guarantee that it actually occurs. However, an even larger percentage of the value of resource assets sold off by the Alberta government should be placed in the Heritage Fund each year.[20]

Second, what is the optimal use of Fund's resources? Lending to other provinces or even the federal governments for them to meet their consumption needs, at least in so far as first-round effects are concerned, is certainly not optimal. There is no guarantee whatsoever that investment in the country will be expanded this way. Albertans may receive the interest payments in future, but net wealth may not have been created for Canada and Canadians in general. Of course lending for direct physical investments in other provinces (which might not otherwise take place) such as the Prince Rupert grain terminal is clearly another matter.

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[20] See ibid. for more details

Third, the problems created by foreign ownership suggest that Alberta would be well advised to invest in the energy sector directly, or indirectly through a government and taxpayer-owned corporation. This investment should be in the form of equity, not debt, so that the gains from additional world enery price increases will accrue to this corporation rather than to foreign investors. There are few investments where the market risk of insufficient future sales could be less than in energy today.

Not incidentally, Alberta would probably be better off investing in oil sands plants, which actually involve refining as well and in that sense are manufacturing, than attempting to invest or promote investment in industry in Alberta for which the local market is too small for sufficient economies of scale to be achieved to compete effectively with imports from production elsewhere in Canada or abroad. It is true that there are many more industries for which production to serve the needs of two million people, especially when they are isolated to some degree by transporation costs, can be competitive than was once thought. But still, given the vast needs for energy production in Canada in the future and the knowledge that much of this energy production will have to come from Alberta, whether it is conventional oil and gas, heavy oil, oil sands, or coal, it may not be a sensible policy for Alberta to overheat the economy even more than it is already, by attempting to stimulate a lot of other types of manufacturing, even if these could be competitive. Just the continuing investment in housing, along with the wide range of supporting social overhead capital or infrastructure plus the warehousing and merchandising and service industries that an increased population demands, will mean that investment and employment in Alberta for growing numbers of people will continue well into the foreseeable future.

Other provinces like Ontario might view more favourably the retention of oil revenues by Alberta if the latter showed more interest in increasing its purchases from the rest of Canada, not in decreasing them in favour of local production. This is one of the major ways that the Canadian macroeconomic adjustment problem would be simplified.

This leads to another point concerning the propensity of foreign-owned firms to purchase more of their needs abroad than domestically owned firms. Since it is expected that Canada is going to need many more oil sands plants in future, it would seem reasonable that Canadian firms negotiate with foreign bidders on the huge amounts of machinery and equipment which Canada has to import (imports equal 75 per cent of domestic consumption - although Canada also exports some specialized machinery and equipment too) to obtain a licence to produce them in Canada. Where the technology of manufacture is well known, or not difficult, new firms could be set up in Canada to supply domestic needs. This new production could be located in provinces such as Ontario and Quebec where there already is a pool of skilled labour or at least additional people could be trained most readily with the aid of the existing workers and firms. This, of course, would on occasion require negotiations at the national level, where necessary playing one foreign supplier off against another - just as the Japanese do, and developing countries do, and as Canada must respond to when attempting to supply CANDU reactors to other nations. Government participation in all subsequent oil sands plants via major equity interests would be one way of being intimately involved in this process. Oil sands technology is highly specialized, and Canada is going to be involved in it for years to come. There are good reasons why we should have the capacity to supply much of the basic machinery and equipment needs in this country.

The standard argument against such a policy is that we may not have a comparative advantage in this area - that to follow a policy such as we are suggesting is a beggar-thy-neighbour to attempt to create employment domestically at the expense of employment abroad. But those who downgrade this possibility generally argue that monetary and fiscal policy can be used to create domestic employment. More and more, with high unemployment rates persisting, it is evident that this is not as easy as it is made out to be. If the additional employment is created in the production of non-tradeable goods and services, or instead consumption demand is sustained simply by transfer payments like unemployment insurance, Canada will not be generating the capacity to replace imports or increase exports. This seems to be the situation at present, with many manufacturing industries running close to capacity even though unemployment remains high, so that a further depreciation of the dollar will not readily produce an improved merchandise account balance.

It is easy to argue that Canada's comparative advantage is in crude resource production and that this is where we should concentrate our efforts. But the employment-creating effects of additional resource production and export are less than the employment-destroying effects of reduced manufactured goods output. In fact relying excessively on non-replenishable resource exports, particularly if the rents go abroad, may be a long-run beggar-thyself policy. (Note, however, that this conclusion can be applied equally well at the provincial level.) In addition, when there is one or only a few large suppliers abroad, competition may be improved by fostering production with a domestically owned and controlled plant.[21]

In summary, as oil prices are gradually increased to world levels, methods need to be devised to ensure that, in so far as possible, the benefits from such increases and from the exploitation of Canada's non-renewable oil and gas resources in general, accrue to Canadians and are not simply appropriated by foreign transnational firms operating in this country. In the process of achieving this objective, a substantial portion of the economic rents from the resources needs to be saved for investment yielding future returns when the resources are exhausted, rather than being used simply to augment current consumption.

APPENDIX

The Model

(1) Canadian-owned revenue from $1 increase in the oil price

(a) Royalties $r_g (1-f) + r_f.f$

(b) Corporate income tax: $\pi_o [1-a_g) (1-f) + (1-a_f)]$

$+ \pi_a[1-r_g) (1-f) + (1-a_f)f]$

(c) Withholding tax: $w(1-p) [1-r_g (1-f) - r_f.f$

$- \pi_o\{1-a_g) (1-f) + (1-a_f)f\}$

$- \pi_a\{1-r_g) (1-f) + (1-r_f)f\}]$

d) Dividends and retained earnings due to Canadians:

$p[1-r_g(1-f) - r_f.f - \pi_o \{(1-a_g) (1-f) + (1-a_f)f\}$

$- \pi_a\{(1-r_g) (1-f) + (1-r_f)f\}]$

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[21] See W.M. Corden, Trade Policy and Economic Welfare (Oxford: Clarendon Press, 1974) 217.

The total of these four items is:

$$y = 1 - (1-w)(1-p)[1-r_g(1-f) - r_f.f - \pi_o\{(1-a_g)(1-f) + (1-a_f)f\} - \pi_a\{(1-r_g)(1-f) + (1-r_f)f\}] = 0.7871$$

(2) Foreign-owned revenue from a \$1 increase in the oil price is:

$$1 - y = (1-w)(1-p)[1-r_g(1-f) - r_f.f - \pi_o\{(1-a_g)(1-f) + (1-a_f)f\} - \pi_a\{(1-r_g)(1-f) + (1-r_f)f\}] = .2129$$

Where r_g = average royalty rate on Crown lands oil production = 0.42.

r_f = average royalty rate on freehold lands oil production = 0.125

f = proportion of oil production from freehold (i.e. non-crown) land = 0.20

π_o = federal corporate profits tax rate = 0.36

π_a = Alberta corporate profits tax rate = 0.11

a_g = resource allowance which oil companies are entitled to deduct from gross revenues from crown lands to arrive at taxable income for corporate tax purposes = 0.25

a_f = resource allowance which oil companies are entitled to deduct from gross revenues from freehold lands to arrive at taxable income for corporate income tax purposes = 0.344

w = federal withholding tax = 0.15

p = proportion of total profits due Canadian shareholders of oil companies = 0.18

x = proportion of Canadian crude production exported in either crude or refined form = 0.128

J. A. Grant

I take the subject of recycling to refer narrowly to the disposition of the funds generated in the hands of energy producers and governments by increased energy prices, rather than considering the prior questions of the appropriate sharing of the initial distribution of the rents involved.

Other papers prepared for this conference have shown that we cannot deal with the recycling problem until we have a clear view of who will have what to recycle. At this time it is not all clear what rate of increase in energy prices will be decreed, nor at what rate the production of energy will change in various jurisdictions, nor the extent to which Canada's energy production will be exported, nor the fiscal arrangements which will determine the ultimate accrual of revenues to oil, gas, coal, and electricity producers, to provincial governments in their capacity as landowners or as taxers of income, or to the federal government in its various capacities.

The public conception of the so-called 'recycling problem' has tended to focus on the role and size of the Alberta Heritage Savings Trust Fund. This is appropriate only in the sense that it is the potential concentration of savings flows in a few hands which raises the important policy questions about recycling. In other respects, focusing only on the Heritage Fund is inappropriate, because the fact of the matter is that there will be a very large recycling of funds no matter in whose hands the revenues accrue. For example, the large integrated oil and gas producers, who will receive some share of the incremental rents after all royalties and taxes have been paid, will decide whether to recycle those revenues into further exploration and development in the energy industry in Canada, or diversify their activities into totally different industries in Canada, or repatriate funds to parent corporations outside the country for investment, or alternatively pay out dividends. Governments may choose to leave a large share of the rents in such private hands for recycling under the principles of profit maximization, and if they do it then becomes important to consider whether taxation regimes in Canada are appropriately designed to encourage the reinvestment of these rents in Canadian enterprises.

Even when we consider the portion of the incremental rents which are held in public sector hands, we can realize that the fundamental recycling problem is really the problem of deciding whose investment preferences will control the investment of the funds involved. To the extent that the energy-producing provinces manage to retain control over the disposition of the funds, it is they who will decide how to recycle them, and their investment criteria which will rule. The first point worth making is that if the present structure for sharing incremental energy price increases is left intact, we are likely to be dealing with a very large provincial fund indeed. We have to remember that the Heritage Fund as such currently disposes of some 30 per cent of the resource revenues of the province of

Alberta; the other 70 per cent remains in the general revenue fund and is applied to general provincial purposes. We have done some calculations to see what volume of funds the province might be in a position to save for the future if we assume that its expenditure growth will not accelerate to keep pace with higher resource revenues.

In 1979 the province of Alberta's resource revenues will be roughly $3.8 billion, of which some $1.1 billion will enrich the Heritage Fund and the remaining $2.8 billion will enter the province's general revenue fund. Of this, roughly $1.9 billion will be used to fund regular budgetary expenditures and about $850 million will be surplus, available for investment. We have worked out what might hypothetically happen to these numbers if the price of Canadian oil went to the world level immediately at the beginning of 1980 and then escalated along with the world price every quarter, at an inflation rate of 13 per cent a year. We assumed further that the price of natural gas would escalate in proportion to that of domestic oil, and that Alberta's share of total national oil and gas production would remain constant for the next few years. Under these extreme assumptions - at least I hope they are extreme - Alberta's resource revenue would jump in calendar 1980 to roughly $7.4 billion, and in 1981 to roughly $7.8 billion. How much of this would be available for investment purposes, of course, would depend on the province's policy with respect to other revenues and with respect to expenditure growth. However, resource revenues currently provide some 46 per cent of the financing of provincial expenditures. If we assume they will continue to provide 46 per cent of funding for provincial expenditures, and if expenditures grow at 12 per cent a year, then the province will use up $2.3 billion in 1980 and $2.6 billion in 1981, leaving $5.1 billion and $5.2 billion respec tively available for saving in the broadest sense.

At present the Heritage Fund is devoting roughly $1 billion a year to the funding of projects within the province of Alberta, leaving an estimated $2.2 billion to fund other investments. On my 'immediate world price' assumption, therefore, the Heritage Fund and the provincial Treasury between them would be able to inject between $4 billion and $5 billion a year into the country's savings flows in addition to maintaining its present level of involvement in the funding of Albertan projects themselves.

To put this in perspective, we might remember that the entire pension fund industry in Canada, investing the contributions of public sector and private sector employees and employers as well as the reinvestable income from assets already in place, will have a total cash flow of about $5.5 billion this year, and in the order of $6 billion next year and $7 billion in 1981; at least it will if there is no immediate rise to world oil prices.

All Canadian life insurance companies together invest net new money of roughly $3 billion a year. All Canadian credit unions and caisses populaires taken together loan or invest roughly $4½ billion a year. It is clear that the scale of the funds under the jurisdiction of one authority is potentially staggeringly high in the context of the Canadian economy as a whole.

As my partner Peter Campbell has pointed out in a discussion paper for this conference, the financial markets are not likely to have any difficulty in providing intermediation services as such to channel the funds to borrowers. The interesting questions raised by the potential concentration of saving have rather to do with the nature of the criteria and preferences which are likely to be expressed by the savers. As Wilkinson and Scarfe have pointed out, Alberta's Heritage Fund represents a conscious decision to save rather than to consume; it represents an implicit judgment that if the funds were paid out to individual Albertans they would be consumed to a considerable degree, and I don't think anyone will disagree with this view. It has also been pointed out that by retaining the funds in provincial hands, they can avoid federal taxes, and even the investment income on the funds is currently not taxable, whereas if the funds were paid out to individuals and either consumed or saved they would be subject to federal taxation.

Wilkinson and Scarfe observe that the province is effectively choosing to substitute consumption in the future for consumption in the present. By doing so, it is effectively slowing immigration into the province, and will tend to keep what residents it has for a longer time into the future after the oil revenues have begun to run down. But I think that one of the most interesting implications of this from the recycling point of view is that we have here a potentially huge and single-minded investor whose rate of time preference is low relative to that of most other investors. Even private pension funds, whose time preference is in theory quite low, act in practice as if they are very concerned with short-run volatility and short-run returns. Here we have, at least potentially, a decision-maker which can afford to maximize long-run returns, and for which diversification has a fairly special meaning. This investor will in principle wish to invest in assets with a relatively long-term payoff, assets which are likely to be particularly productive in a future world where Alberta energy production is falling. Since no one can say whether the real cost of energy will be relatively higher or lower in the future, and indeed no one can say anything much at all with confidence about relative costs and relative country growth rates in the future, such a fund also should strike out for a high degree of diversification, probably greater than the Canadian economy as such can provide.

From the point of view of Alberta, maintaining control over its resource rents probably means in the long run the freedom to invest worldwide and on a very long-term basis. Parenthetically, as we watch the current debate about the share of the rents which will accrue to the federal government, we should not blind ourselves by the huge size of the current federal deficit. I think that we can be reasonably sure that by 1982 or sooner, the federal deficit will be substantially smaller than it is today, although 1980 and 1981 are a different matter. In the next year or two it is almost inevitable that Ottawa will take a lion's share of the resources invested in the domestic capital market; but beyond that point I anticipate a significant surge in revenues at the federal level and a correspondingly high priority to direct recycled loanable funds in different directions. The greater the concern in Canada in the eighties for investment in the energy-producing industries, the greater the likelihood that the Alberta surpluses would be increasingly directed into other industries and even outside Canada. Recycling therefore is a question of finding financial assets which will meet the portfolio-strategic purposes of the recyclers.

Finally, then, we must consider the Heritage Fund and similar pools of energy funds as representing the injection of a new, highly concentrated, and uniquely oriented set of investment preferences. Such pools will inevitably reshape the development of the whole Canadian economy, and they may turn out to provide one of our most important approaches to the international capital markets.

G. D. Quirin

Mixed emotions, someone has said, are what you feel on being informed that your mother-in-law has just run your new car into a cement truck and walked away without a scratch. They are also what I feel on the Wilkinson-Scarfe paper. A large part of it is highly competent, original analysis revealing technical skills of a high order. Though I have a few quibbles, it being the duty of academics to quibble, in general I wish I'd written it myself. However, I feel I must take strong exception to the Fourth Part, which addresses itself to the supposed leakages from the cycle brought about by the multiplicity of foreign-controlled firms in the oil industry. While such leakages no doubt may occur, and it is true that to the extent they involve economic rents they represent a deadweight burden on the Canadian economy, the factual analysis is superficial, static, and short-run in its outlook and in my view quite incapable of supporting the message that has been hung from its shoulders.

My objection is not that this section reflects Canadian economic nationalism; for I too would like to see a greater Canadian presence in the industry and regret its absence. This is neither the time nor the place to discuss its causes. My objection is rather that the section reflects negative nationalism, more anti-American than pro-Canadian. It appears quite willing to risk increasing the number of barrels on which we pay $25.00 to some overseas supplier in order to avoid paying it to an American-owned company operating in this country.

No excuse is needed for being nationalistic. Canadians have every right to expect their own governments to put their interests first, second and third, and to complain when they do not. Nor is there any need to apologize to the rest of the world for so doing. In particular, we would be wise to refrain from the kind of analysis indulged in where the authors claim we are doing this for world welfare. The only welfare being increased is our own, and it seems more straightforward to suggest that US investors interests should have zero weight in a Canadian social welfare function than to indulge in speculation about what weights they should have in a world social welfare function. It is not clear, given the increasing dominance of pension funds in US capital markets, that the weighted average income of the beneficial owners of shares in the relevant oil companies is higher than the weighted average income of Canadian oil consumers. Would the authors change their tune and advocate increasing the share of economic rents to US capitalists if it were shown that the 'capitalists' were all pensioners with an average income half that of Canadians?

The heart of the case that syphoning is a problem rests on the model presented and the computations based on it. Looking at this model with some care, I felt obliged to offer the following observations:

1 One critical variable is y, defined as the proportion of total profits due Canadian shareholders of oil companies and estimated at 0.18. The estimate is based on the share of industry sales and profits accounted for by foreign-controlled firms, with no deduction for the equity of Canadian minority shareholders in such firms. Since there are substantial Canadian minority shareholdings in a large number of the firms, the share is clearly overstated. Using the alternative figure for Canadian ownership of profits, presented in 13, the Canadian share is probably closer to 22 per cent than to 18 per cent, before the transfers of Husky and Pacific from the US-controlled to the Canadian-controlled category, which may not have had all that much impact on the equities involved.

2 The analysis assumes that the marginal crown royalty rate is equal to the average current royalty rate of 42 per cent. This is indeed the figure implicit in the present royalty schedule. But, in historical fact, price increases have been followed rather promptly by increases in Alberta royalty rates, and there is little reason to suppose that a government which has done this repeatedly in the past is suddenly going to develop scruples. The long-run marginal rate is probably closer to 50 per cent than to the 42 per cent used in the analysis. Changing the royalty rate from 42 per cent to 50 per cent and the Canadian ownership percentage to 22 per cent changes the foreign revenue fraction from 0.2129 to 0.1601 and the net additional payment to foreigners from a $1.00 increase in the oil price becomes $0.0321, not $0.0849, a reduction in cost of 62 per cent.

3 This analysis leaves gas completely out of the picture. While gas royalties are lower, the exported percentage is higher, nearly 40 per cent. It seems to be probable that the marginal impact of a gas price change is positive, given the percentage exported. This should be offset against the marginal drain resulting from an increase in oil prices, unless it is claimed that oil price changes and gas price changes are independent of one another.

4 The whole business is very sensitive to changes in the percentage exported. Indeed, using any numbers, if more than 16 per cent of output is exported, Canada is a net gainer despite the syphoning. Even on the Wilkinson-Scarfe figures, it is a net gainer if more than 21.3 per cent is exported.

The percentage exported has been as follows: 1971, 46.8; 1972, 50.8; 1973, 54.3; 1974, 45.8; 1975, 41.5; 1976, 31.4; 1977, 20.7. In other words we did not fall below the marginal number until 1977, and then only on the Wilkinson-Scarfe calculation and not on mine.

Whether the whole business pays or not, apart from the gas factor, is critically dependent on the proportion exported. If we are able with frontier discoveries for example to return to the exporting ranks, the net benefit possibility remains open to us, despite foreign ownership. In my judgment, this scenario is a lot more likely at the world price than at 55 per cent of the world price, and not too likely with excise taxes.

5 By far the most serious omission is the failure to consider the fact that for several years virtually all Alberta mineral rights and most others have been disposed of at public auction, and to count the revenues received on such sales as what they are, prepayment for economic rents. Canadian governments have obtained $2.2 billion from this source in the period 1976-8. There is every reason to believe that with competitive markets, the auction process is capable of capturing all of the economic rents which are not captured by the tax system, except for those which may be generated after the fact by unanticipated increases in price. While some portion of the 1973-4 changes was clearly in this category, it is my firm impression that at least some portion of it, perhaps as much as half, was anticipated from 1971 on. Since it has been avowed policy since 1975 to raise crude prices gradually to world levels, and since the 1979 increases merely restored the real price of 1974 in US dollars, it is difficult to suggest that there is any unanticipated windfall element in recent price changes. Having sold the rights to collect rents in a competitive auction and been paid for them, it seems to me a bit thick to complain when the purchaser collects what he has bought. It is of course possible to argue that some form of market failure prevents auctions from capturing rents, but the evidence is quite otherwise. Meade's work on US offshore lease sales suggests that virtually all of the rents are effectively captured by an auction process inferior to that used in Alberta.

The excessive concern with the short run as opposed to the long run lies in the apparent lack of concern for developing future supplies. Clearly we can benefit from any production we can develop at a real cost less than the laid-down OPEC price; if we develop more than we use we can export it profitably enough. Out ability to push development to the margin of social profitability is seriously impaired already by the high rate of flat-rate royalty, yet the authors propose to drive a further wedge between marginal cost and price by means of an excise tax. I share Professor Powrie's concern over the need to develop a less bludgeon-like revenue sharing system; the authors here merely suggest putting more lead in the blackjack. We have special deals with low royalty rates for tar sands and heavy oils. These reveal all the difficulties that emerge when bureaucrats set out to 'fine tune' markets. They prevent development of conventional reserves costing over $9.a barrel, while giving the go-ahead to development of unconventional revenues costing twice as much. If that is not inefficiency, I don't know how it should be defined.

As to the concluding observations, I am again of two minds. Insofar as they relate to the recyclying problem and the Heritage Fund, I am in broad agreement. While I share the view that a large share of revenues should go into the Heritage Fund, I note that much of the rest seems to have gone into physical infrastructure investment within the province, and this too contributes to the future productivity of the regional economy. I share the prejudice that the contributions to the fund should represent an addition to net savings. However, refusal to lend to a central government which is hell-bent on increasing consumption will not deter it from doing so, as long as it has access to the monetary mechanism and can borrow from the central bank. By doing so, it can quite effectively frustrate any savings-oriented initiative undertaken at the provincial level, so some co-operation is needed. As to the need to get it into physical assets, the capital market is presumably there to see that in the end it does, providing it represents a net addition to savings.

As to the proposals to invest in the tar sands and in Imperial Oil, I must confess to a degree of scepticism. First of all, there is in my mind some question of such investments being compatible with the avowed purpose of the Heritage Fund, to maintain income levels when all the oil (including presumably that in the tar sands) is gone. In the shorter run I have doubts about the profitability of the tar sands versus alternative investments, though its high costs give it enormous effective leverage in the face of possible unanticipated crude price increases. However, I am not sure that Alberta needs the hedge against increases in crude prices.

Imperial is, in my own view an excellent investment. There is no need to wait until the majority interest can be purchased; since the stock is traded on several stock exchanges, the Heritage Fund could start accumulating it tomorrow. Several other buys are almost equally good, in terms of short-run investment performance. There is no particular magic in the majority position, and if it were bought on a 'willing-seller' basis I am sure the Heritage Fund would pay too much for it. In any event the long-run compatibility of such investments with the Heritage Fund's objectives seems dubious. The authors seem convinced that the best short- to medium-term place to invest is in energy production. I think it is too; but if that is so, why not let the existing companies, which have a degree of competence not yet dreamed of in the higher reaches of the bureaucracy, do the investing?

Leonard Waverman

When I first read the Wilkinson and Scarfe paper I thought perhaps it was the Alberta government's position, but I guess it's an example of what is called 'symbolism.' There are three tenets of the paper I would like to draw your attention to. These tenets are that within the context of the Canadian economy savings rates are and will be too low, that someone, not the invisible hand in the market, must save, and that it can't be a foreigner because foreign investment is a loss to the economy.

Each of these points is open to dispute. I think it is unproven that savings rates are or will be too low within the context of the Canadian economy. We have in the past, as Professor Wilkinson suggested, run on foreign capital markets. It is unclear to me why that has left us in a position which is wrong today. Robert Solow in a paper on natural resources talked about savings rates and says it has always turned out that we have saved too much, because each generation is far richer than the previous generation thought they would be. If our forefathers came back today and saw our wealth they would undoubtedly say: 'My God, we consumed too little in order to save for you.' So the first point is that I think it is unproven that savings rates are too low.

The second point that we cannot rely upon the market to generate savings is also unproven. We read in the paper about enormous investments. Vast sums of money have been suggested. But energy investments as a percentage of GNP are not out of line in the future - investment requirements have been as great in the past. Even if they are greater than that I am not clear why markets cannot function to provide those investments, or why a paternalistic someone must provide those investments.

Related to that is the notion that it is unwise to use natural resources for augmenting present consumption. That's fairly paternalistic point of view. Have voters decided that, or is that the view of Professors Wilkinson and Scarfe? What is the evidence for that?

I would like to agree with some of what Professor Quirin said about foreign involvement. The static equilibrium analysis of foreign investment is very rudimentary and can be quite dangerous. There are countries in which Canadian-owned corporations are earning lots of economic rent and they may be faced with similar arguments. Those governments can face the corporations with this paper and say 'See, these are losses, and when you originally came in to invest in the economy you did not know these prices were going to occur and now we can't have any increases.' I think more can be written about the foreign investment side than is contained in this paper.

The final point I would like to make is that the proposal that the Heritage Fund purchase a large multinational, perhaps Exxon, is an incorrect solution. To purchase at market prices, presuming it is not a nationalization, would just be capitalizing all the future rents, and I can't see how that would make the Alberta Heritage Fund any better off.

Discussion

TOM WILSON: I am going to direct my questions to David Quirin and Leonard Waverman. I take it from your remarks, David, that you are arguing that the windfall gains which occurred were largely anticipated in the bidding, and I take it from the last remarks of Len that at least partially he supports that position.

I have some figures here prepared by a colleague. He indicates the rates of return in the market, not 'accounting' rates of return but actual rates of return, over the period 1974 to 1979; capital gains plus dividends for integrated oil firms were 55 per cent, for oil and gas producers 35 per cent. The difference presumably is accounted for by the fact that integrated firms are more able to exploit the tax angle. The combined rate of return is 44 per cent. For comparison the rate of return on the TSE generally was 7.6 per cent over that period. How on earth can one argue that such returns were fully anticipated? The coefficients for these firms are not large enough to indicate that those kinds of returns would have had to be anticipated in order to compensate for risk.

I would suggest that the behaviour of the stock market clearly indicates that there have been unanticipated windfalls, and it is quite correct for a country under these circumstances to renegotiate the terms of the implicit contract. I don't think we are setting any precedents for our overseas operations. Any other country that is sensible would renegotiate the terms of Canadian companies with resource rights which were subsequently subjected to unexpected price increases.

COMMENT: We are putting the cart before the horse. Canada has a serious energy supply problem in the 1980s and beyond. I would like to congratulate Professors Wilkinson and Scarfe for their appreciation of this problem. Theirs is one of the few papers we have seen that has some appreciation for the need for massive investments in oil sands plants and this kind of thing. But we haven't got a national plan to work from, and we are trying to form policy in a vacuum. We need to know where we are going before we can define policies in terms of prices, exports, taxation, and royalties.

G.D. QUIRIN: To rebut a point made by Tom Wilson, I think the rates of return first of all are nominal, not real in a highly inflationary climate. Second, they are extraordinarily sensitive to the choice of years. I'm not certain but the first year that you quoted may be one of those in which the market was unduly depressed by the prospect of Carter and the fact that certain people hadn't made up their minds on how much they were going to zap the industry.

Secondly, I did in my comments make explicit allowance for upward adjustment in the royalty rates in Alberta and observed the provincial government had done so, were likely to do so again, and I don't think anyone expects otherwise.

TOM WILSON: In reply to Professor Quirin, the results are not sensitive to the precise period. In fact if you look over the whole period of the seventies you still get those rates of return. If you look at the last three years you have very high rates of return. My point is that you wouldn't get that unless some unanticipated things have been occurring. If the market had anticipated these events it would already have been capitalized into the profits. The stock market is there to tell us whether windfalls have been unanticipated.

B.L. SCARFE: I think there is very little I can disagree with in the presentation that John Grant made. Mainly he says there is no apparent financial recycling problem and I totally agree with that. He suggests that there may be a problem in the future, if the sharing of revenue going to Alberta increases. It may well be that the Alberta government, if it receives those revenues, will have to consider foreign diversification.

Dr Quirin is concerned about the static, short-run nature of our calculations. He complained about our percentage of foreign ownership versus percentage of control, but we did in fact use a figure for the percentage of Canadian ownership. He complains about the notion that if we do move towards world oil prices, royalty rates will in fact go up. Of course they will. It is the kind of message that we present in our paper that explains why they have to go up. We didn't allow for it in our calculations because we want to show what would happen to the dissipation of those revenues in foreign hands if we did not change our tax royalty structure.

He complains about not properly incorporating the percentage exported. In fact the percentage of oil exported has been falling and is likely to continue to fall. In any case we are already exporting at world prices and we are concerned with the question of moving our internal prices towards world prices. There is nothing happening to our gains from exports. The appropriate number in that particular case is the 21 cents on each dollar per barrel which in fact goes into the hands of foreign shareholders, the foreign multinational oil companies. The 21 per cent figure is the relevant one in the current scenario where we are moving domestic prices towards world prices, but there is no gain on the export side from that particular move because we presumably have already got that by selling at world prices in export markets in the first place.

He is concerned with whether we allowed for capitalization effects through land prices. Clearly the revenues the Alberta government received from this particular effect have been substantial over the last few years, but I think he neglects to mention that there is in fact an offset. As Doug Hartle rightly points out, to a considerable degree that is a transfer from the federal purse to the provincial purse in the sense that the federal exploration and development writeoffs get capitalized into the land sales revenues that the Alberta government receives. Of course a lot depends, as Tom Wilson pointed out, on whether increased prices were anticipated, or unanticipated.

Two or three comments on Len Waverman. He thought he was reading the Alberta government's position paper until he saw us taking the corporations on. He says we haven't proved that savings rates are in fact too low. It seems to me that we have got a somewhat unemployed economy in Canada, and there is something wrong with our domestic policy. We ought to be generating more capital at home and Bruce and I are clearly very concerned about the degree of foreign ownership and control in the Canadian economy. Implicit in our paper is the value judgment that one of our objectives is that in future we ought to be reducing the level of foreign ownership and control in the economy. The only way in which we are going to be able to do that over time is to increase our domestic, public and private, savings rate.

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